A. A. R. MECHANICAL DIVISION CONVENTION NUMBER

JUNE 29, 1935

Railway Age

FOUNDED IN 1856

Dead weight cut 4½ tons

at no increase in cost

This box car was built by Pullman with the object in view of decreasing the dead weight as much as possible without increasing the cost of the car.

THE dead weight of this 50-ton box car has been cut 4½ tons by the use of high tensile alloys and improved design . . . *without increasing costs.*

The strength is the same as that of an equivalent conventional car . . . A. A. R. requirements are complied with and the revenue capacity has been *increased* 4½ tons.

PULLMAN - STANDARD
CAR MANUFACTURING COMPANY

CHICAGO • PITTSBURGH • WASHINGTON, D. C. • NEW ORLEANS • CLEVELAND
HOUSTON • BALTIMORE • BIRMINGHAM • NEW YORK • WORCESTER, MASS.

San Francisco . . . Sales Representative . . . Latham McMullin, Russ Building

LOWER COST PER TON MILE

DUE TO FIRESTONE EXTRA CONSTRUCTION FEATURES

QUESTION No. 1—"Will the non-skid tread give me the greatest traction and protection against skidding?"

ANSWER—The patented construction feature of two extra layers of Gum-Dipped cords under the tread makes it possible for Firestone to use a wider, flatter tread with higher shoulders, that puts more rubber on the road. This, combined with the scientific non-skid design, gives greatest non-skid safety and traction ever known.

QUESTION No. 2—"Is the tire body protected against destructive internal heat, the chief cause of premature tire failure?"

ANSWER—Every cord in Firestone Tires is soaked and saturated in pure, liquid rubber by the patented Gum-Dipping process. This process, not used in any other tire, soaks every cotton cord and insulates every strand, preventing internal friction and heat, giving extra strength, longer life, greater dependability.

QUESTION No. 3—"Will the tread give me long wear at today's higher speeds?"

ANSWER—A new and tougher tread compound developed by Firestone gives you longer wear at lower cost per mile, even at today's higher speeds.

Tests show that . . . Firestone Truck and Bus Tires stop quicker
Gum-Dipped cord body gives greater strength and stamina
More and tougher rubber, with wider flatter tread gives longer Non-Skid wear
Firestone
HIGH SPEED
BALLOON
Gum-Dipped
OLDFIELD TYPE
Gum-Dipped
The Tire That Taught Thrift to Millions
SENTINEL TYPE
Volume Production Tire for Light Trucks

Call on the Firestone Service Store or Firestone Tire Dealer in your community today. Let him tell you about the exclusive construction features of Firestone Truck and Bus Tires which will give you lower operating costs and greater safety.

★★★★★ *Listen to the Voice of Firestone—featuring Richard Crooks, Gladys Swarthout, or Margaret Speaks—every Monday night over N.B.C.—WEAF Network . . . . A Five-Star Program*

AUTO SUPPLIES AT BIG SAVINGS

BATTERIES · SPARK PLUGS · BRAKE LINING · FAN BELTS · DITCH LIGHTS · LOCKS

REAR VIEW MIRRORS · LAMPS · REFLECTORS · FLARES · RADIATOR HOSE

HIGH SPEED TYPE

Gum-Dipped

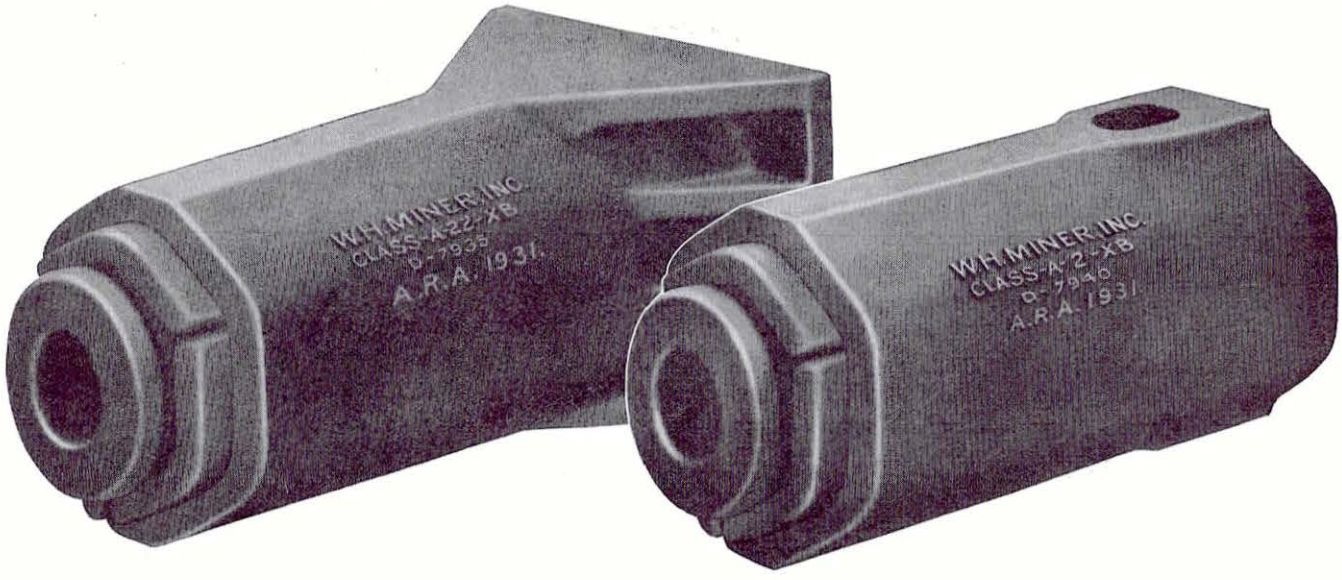
GREATEST TIRE EVER BUILT FOR ALL-ROUND SERVICE, UNEQUALED FOR HIGH SPEEDS and HEAVY HAULING

Firestone

© 1935, F. T. & R. Co.

Published weekly by Simmons-Boardman Publishing Company, 1309 Noble Street, Philadelphia, Pa. Entered as second class matter January 4, 1933, at the Post Office at Philadelphia, Pa., under the Act of March 3, 1879.

Immediate and substantial savings in maintenance expense result when these draft gears are applied to freight cars



MINER DRAFT GEARS retain their ability to prevent shock year after year ensuring continuous car and lading protection and freedom from train slack.

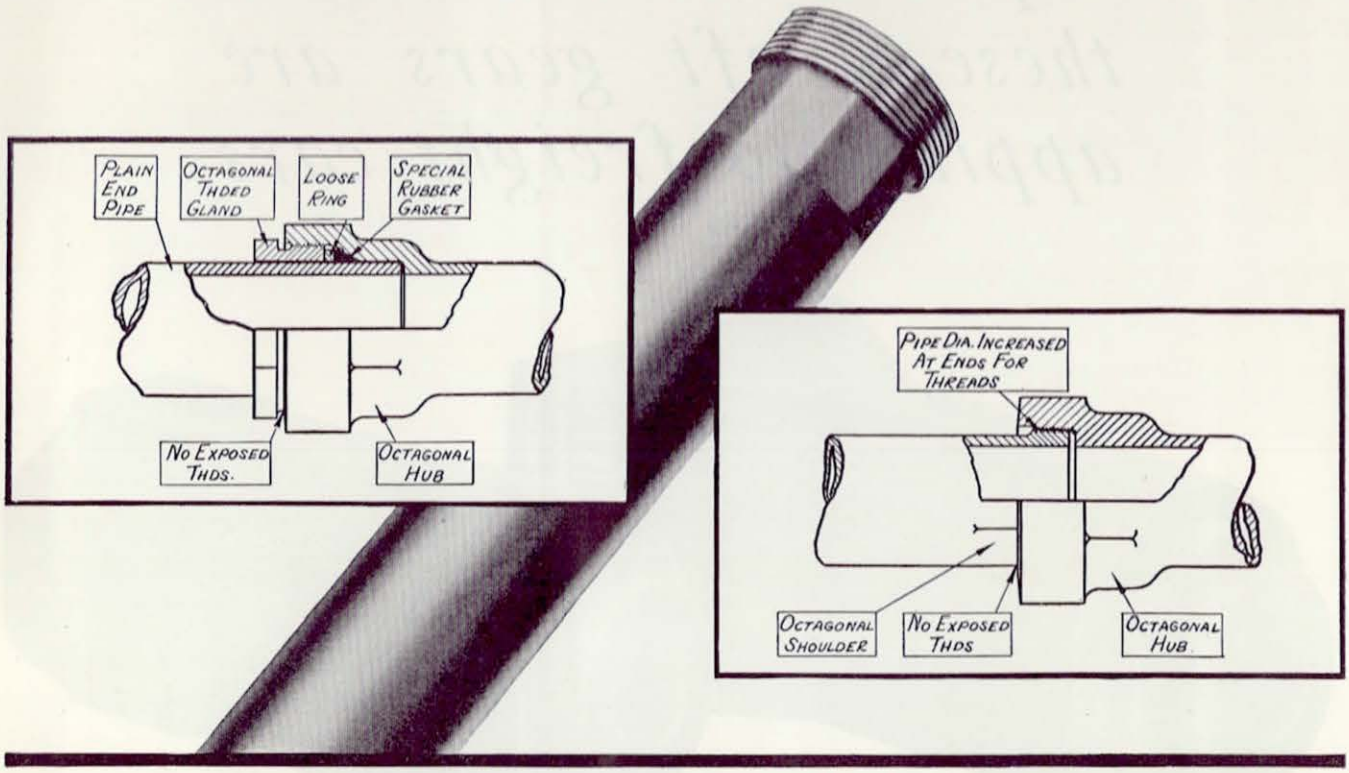
Unequalled resistance to wear

W. H. MINER INC., CHICAGO

Specialists in
Shock Prevention
Since 1894

ANNOUNCING...

WALWORTH HI-TEST CAST IRON PIPE FOR WATER AND GAS



A fast-laying and economical pipe of the highest quality is yours with this new Walworth Pipe. Primarily intended for use on underground water and gas lines, it is furnished in sizes 1¼" to 6" inclusive and in 20 foot lengths. The Walworth Hi-Test Cast Iron flexible expansion joint should be used every 80 to 100 feet so as to absorb expansion and contraction by means of this bottle-tight joint.

In addition, Walworth provides for making all threaded joints above the ground. Expansion joints are made with open end wrenches. There are no bell holes to dig—no joints to caulk. And there are less joints to make.

Walworth Hi-Test Cast Iron Pipe provides a most economical and convenient method of piping for water and gas distribution systems, sewage treatment and filtration plants and lines in general where corrosive conditions are such that steel or wrought iron pipe do not give satisfaction.

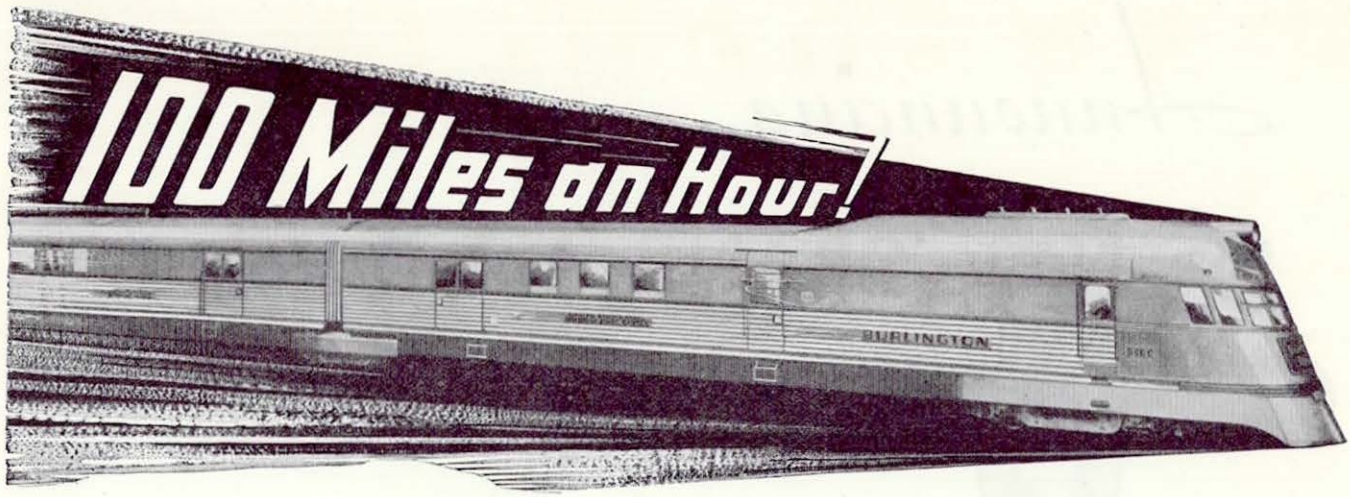
The outside diameter is the same size as Standard Steel Pipe. Walworth Hi-Test Cast Iron Pipe can be cut and threaded for use with standard size threaded fittings.

WALWORTH

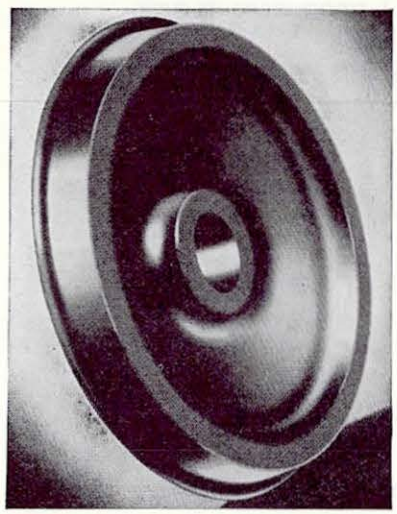
VALVES FITTINGS and TOOLS
Backed by 93 Years' Service

WALWORTH COMPANY
60 EAST 42nd STREET, NEW YORK

DISTRIBUTORS IN PRINCIPAL CITIES THROUGHOUT THE WORLD



THE SERVICE THESE WHEELS HAVE BEEN WAITING FOR



BETHLEHEM FORGED-STEEL AXLES

In strength and wearing qualities Bethlehem Forged-Steel Axles match Bethlehem Wrought-Steel Wheels. They can be supplied heat-treated, normalized and tempered, annealed or untreated; rough-turned on journals and wheel seats or rough-turned all over.

HUNDRED-MILE-AN-HOUR speeds on rails are just arriving, but hundred-mile-an-hour stamina has been worked into all Bethlehem Wrought-Steel Wheels for a long time . . . Consequently, the coming of new types of light, high-speed equipment brought no wheel problem, despite the revolutionary speeds involved. Bethlehem Wrought-Steel Wheels were ready and waiting for just such tasks. The forging and rolling operations of manufacture give these wheels tremendous strength and endurance, and the special heat-treatment of the rim gives them wearing qualities that mean thousands of miles of trouble-free service . . . The Bethlehem Heat-Treated Wrought-Steel Wheels that you buy for ordinary, every-day service are as strong, as long-wearing, as thoroughly dependable, as those that have been called upon to carry the Zephyr and the Flying Yankee at scheduled rail speeds heretofore unheard of . . . Use Bethlehem Heat-Treated Wrought-Steel Wheels, and discover how low wheel-maintenance can be.

Bethlehem District Offices are located at: Atlanta, Baltimore, Boston, Bridgeport, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Houston, Indianapolis, Kansas City, Milwaukee, New York, Philadelphia, Pittsburgh, St. Louis, St. Paul, Washington, Wilkes-Barre, York. *Pacific Coast Distributor:* Pacific Coast Steel Corporation, San Francisco, Seattle, Los Angeles, Portland, Honolulu. *Export Distributor:* Bethlehem Steel Export Corporation, New York.

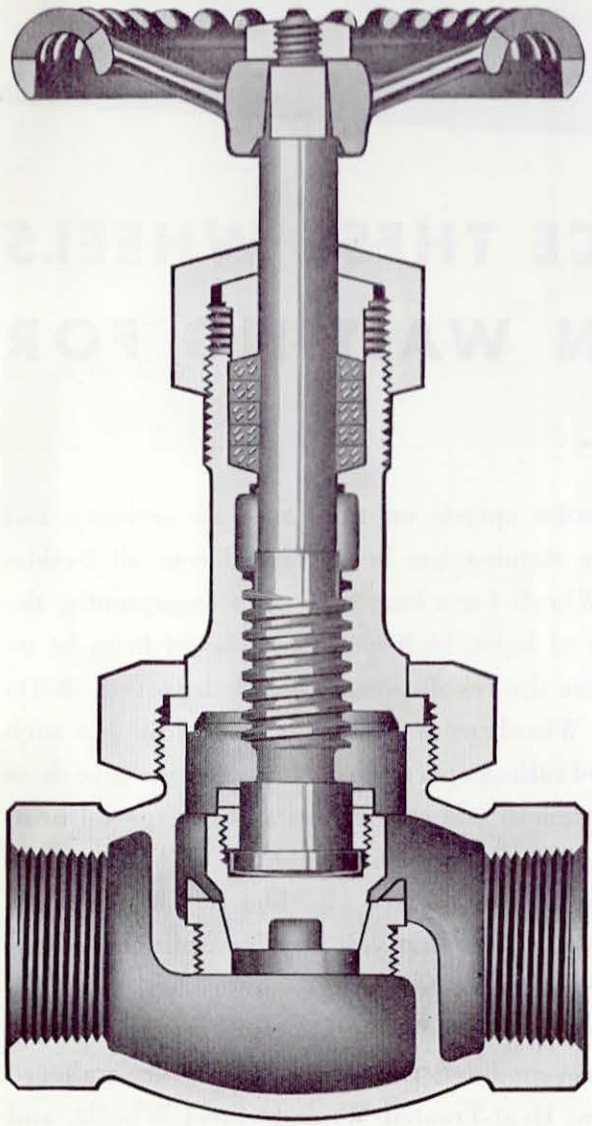
BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

GENERAL OFFICES: BETHLEHEM, PA.

Announcing . . .

the New CRANE A-A-R Valve •

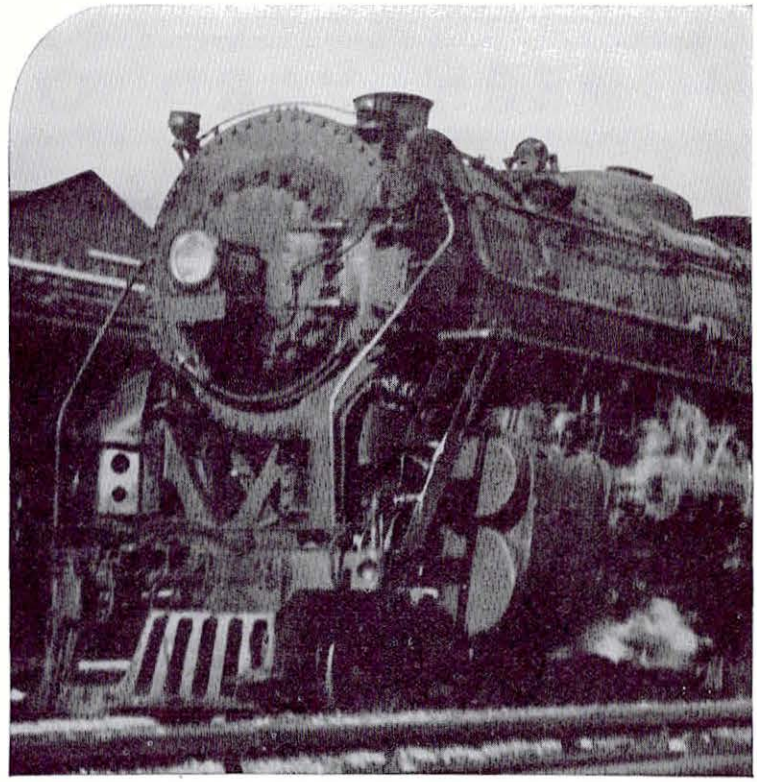


CRANE CO. announces its new AAR Globe and Angle Valves in sizes from one-half inch to two inches. Other sizes and styles will be announced later. These valves are made to AAR specifications with characteristic Crane precision and quality. They are worthy members of a distinguished line of valves, fittings, fabricated piping and plumbing fixtures designed and manufactured for the especial requirements of the railroad industry.

CRANE RAILROAD VALVES, FITTINGS AND PLUMBING FIXTURES

CRANE CO., GENERAL OFFICES: 836 SO. MICHIGAN AVE., CHICAGO, ILL. • NEW YORK: 23 W. 44TH STREET

Branches and Sales Offices in One Hundred and Sixty Cities



OXWELDING

stops Steam Leaks . . .

● Leaky back cylinder heads can be permanently corrected by oxwelding.

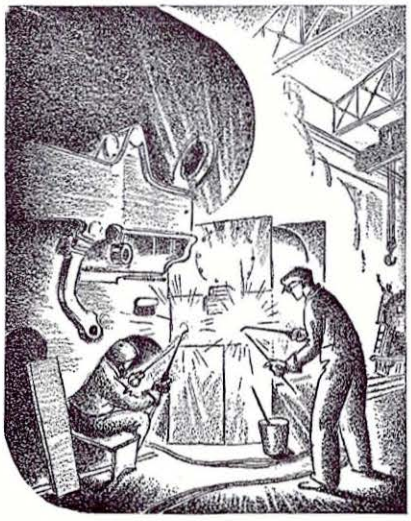
Many railroads have accepted the recommendations of The Oxweld Railroad Service Company to make this job standard repair practice for certain classes of locomotives. On these roads, both the economy of the repair operation and the performance of the repaired parts have been exceptionally satisfactory.

The cost of oxwelding a back cylinder head to a cylinder casting will vary, depending upon the diameter and type of the cylinder, but this job pays for itself over and over by keeping the locomotive in operation—by elimination of maintenance.

In standard practice the back cylinder head is oxwelded to the cylinder casting—making a jointless unit. When this is properly done the "joint" will forever remain tight against steam leaks, because it is really not a joint at all!

This important application is typical of the innumerable economies regularly effected in railroad shops where welding is handled with Oxweld Railroad Service cooperation.

The majority of Class I Railroads are Oxweld clients of long standing. Oxweld Railroad Service assures them all the advantages of the most recent research and development in the mechanical and metallurgical phases of oxy-acetylene welding and cutting.



MAKING A JOINTLESS UNIT

This application of the oxy-acetylene process gives the following advantages:

1. Strengthens the cylinder castings.
2. Makes head and cylinder a jointless unit.
3. Eliminates stud and nut replacement.
4. Eliminates expense of grinding head seats.
5. Reduces running repair and roundhouse maintenance.

THE OXWELD RAILROAD SERVICE COMPANY

Unit of Union Carbide and Carbon Corporation

UCC

NEW YORK: Carbide and Carbon Bldg.

CHICAGO: Carbide and Carbon Bldg.

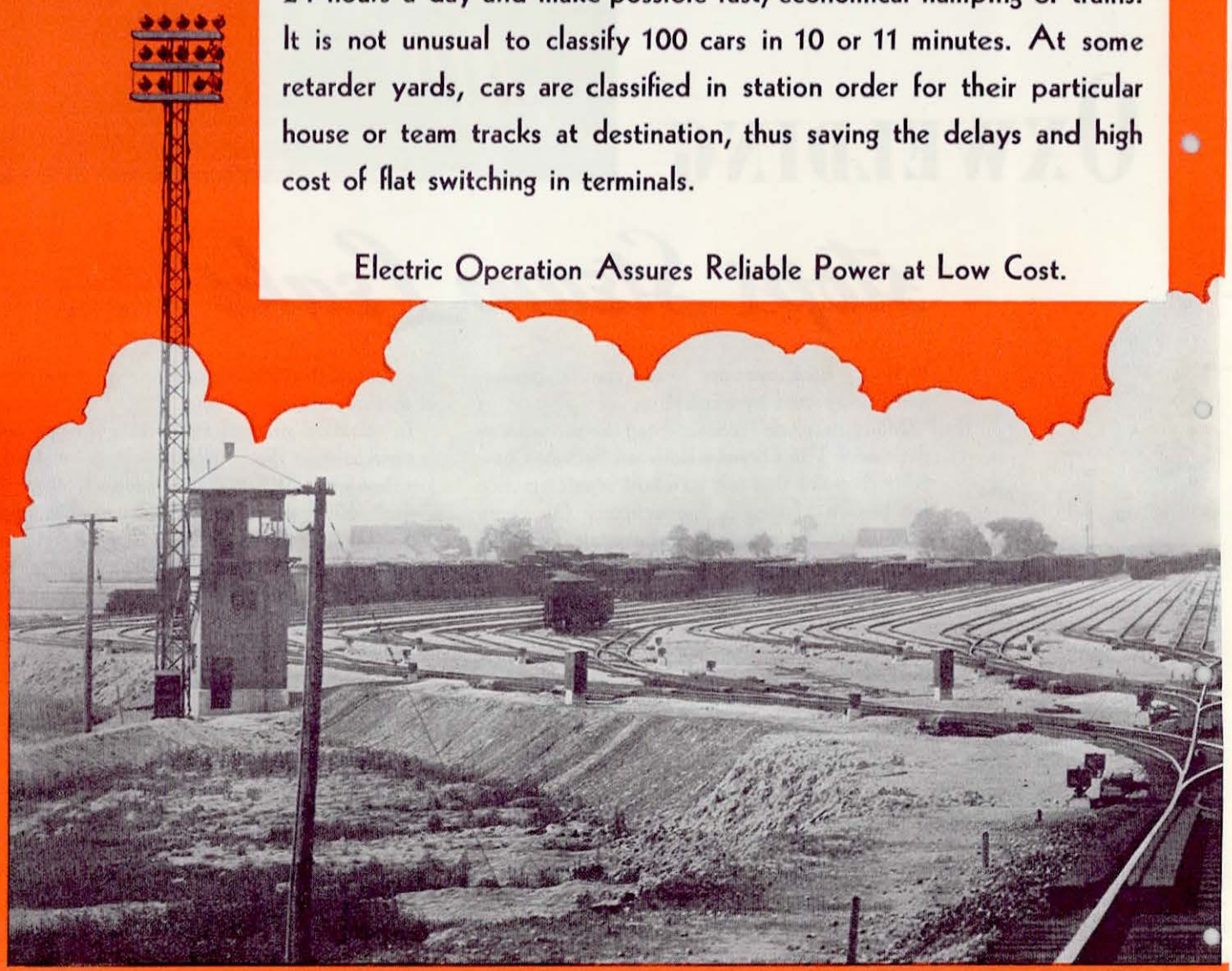
OXWELD RAILROAD SERVICE

MODERN YARD OPERATION CALLS

Modern transportation requires not only fast freight trains but rapid handling of cars at yards and terminals. An hour gained by high speed on the road may be easily lost by delays in classification yards or in slow handling by flat switching in congested terminals.

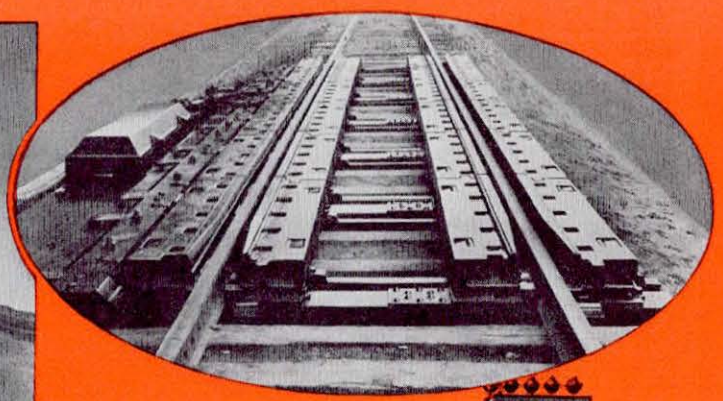
G-R-S Car Retarders are instantly available for maximum service 24 hours a day and make possible fast, economical humping of trains. It is not unusual to classify 100 cars in 10 or 11 minutes. At some retarder yards, cars are classified in station order for their particular house or team tracks at destination, thus saving the delays and high cost of flat switching in terminals.

Electric Operation Assures Reliable Power at Low Cost.



G-R-S Car Retarders facilitate and expedite yard operations at reduced cost.

FOR G-R-S CAR RETARDERS

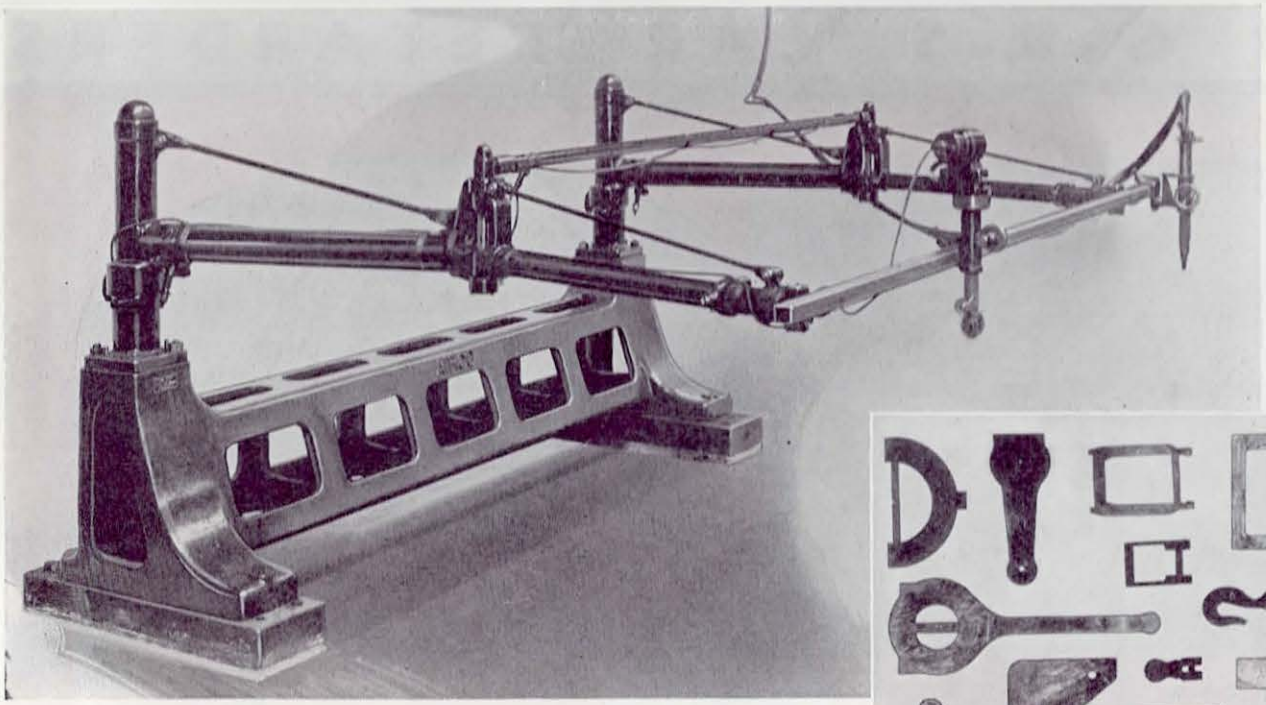


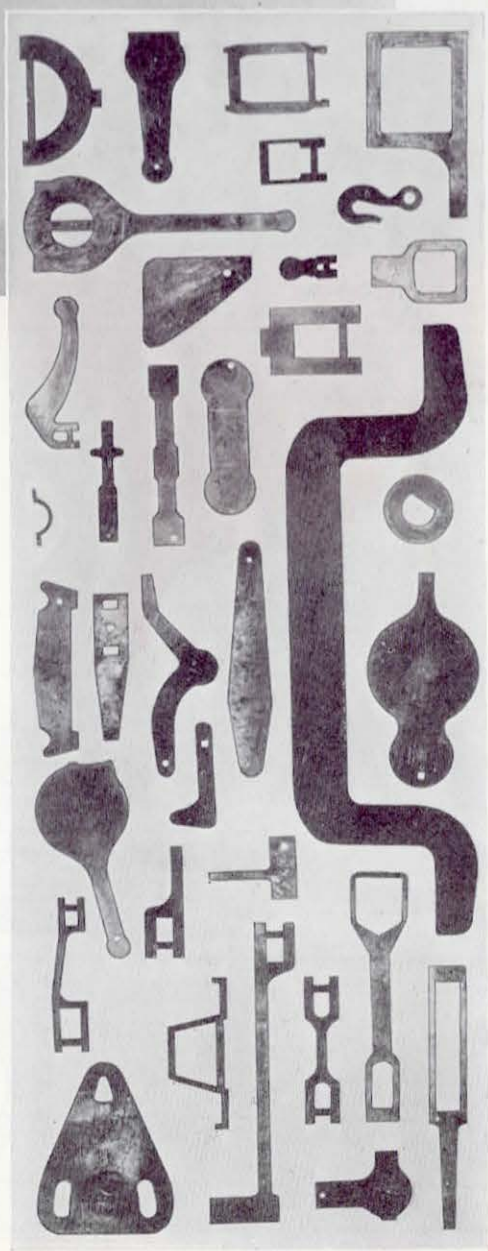
GENERAL RAILWAY SIGNAL COMPANY

New York Chicago ROCHESTER, N. Y. St. Louis A 1277

Montreal London Paris Tokyo Madrid Sydney Calcutta Buenos Aires

The AIRCO-DB NO. 6 OXYGRAPH





A sure-fire investment for any railroad . . . .

The purchase of an AIRCO-DB OXYGRAPH is an investment for any railroad—a sure-fire investment because returns in the form of savings in car and locomotive maintenance are assured.

They are assured because the OXYGRAPH will cut the parts illustrated and many others, in considerably less time, and at substantially lower cost, than they could be produced by any other method. This has been proved, beyond question, in the shops of railroads that are using the OXYGRAPH.

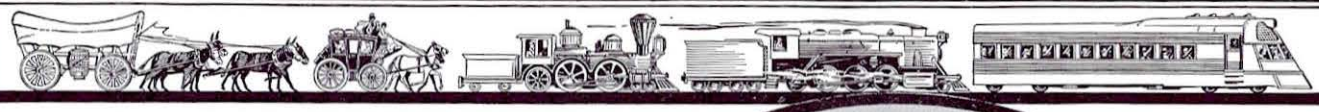
WRITE for the OXYGRAPH BULLETIN

It gives full details about the machine and the range and scope of its work.

AIR REDUCTION SALES COMPANY

GENERAL OFFICES: 60 EAST 42nd ST., NEW YORK, N. Y.

DISTRICT OFFICES AND DISTRIBUTING STATIONS IN PRINCIPAL CITIES



The combined staff of Heywood-Wakefield and former Hale & Kilburn engineers developed this recliner for the New York Central. It has polished aluminum pedestal and arm rests.

H-W and H. & K. engineers also designed, created, and developed new seats for the C. B. & Q. Zephyr . . . for the new streamline day coaches on the B. & M. . . . the N. Y., N. H. . . . the D. L. & W. . . . the Milwaukee . . . and for a number of other new cars all over the country.

NO. 981 10PSS

Because THEY ARE DEVELOPED BY PRACTICAL ENGINEERS!

In these days of streamline transportation, improvements in comfort, luxury, and appearance are being perfected almost daily. Within the past year, for instance, Heywood-Wakefield has pioneered eighteen distinct, definitely original ideas in railroad seating. Each improvement has been painstakingly developed by our engineers in close cooperation with railroad staffs and maintenance men. That's the best . . . the worthwhile reason why . . . it pays to consult Heywood-Wakefield on any seating problem. At our Gardner, Mass., factory we can give you the benefit of the combined Heywood-Wakefield and Hale & Kilburn engineering staffs. These men, with years of actual experience behind them, are pleased to cooperate with you . . . on any or' all of your seating ideas and suggestions. They'll work with you in practical fashion to develop new ideas instead of revamping or copying old ones. Just drop a note to any H-W office listed below.

HEYWOOD - WAKEFIELD ◦ ***Seating*** FOR EVERY TYPE OF TRANSPORTATION

HEYWOOD-WAKEFIELD RAILWAY SEATING OFFICES

George E. Cornwall, GARDNER, MASS

Bertram Berry, 516 West 34th St., NEW YORK, N. Y. . . . Walter M. Swope, 1322 Lincoln-Liberty Bldg., PHILADELPHIA, PA. . . . J. V. Conway & H. B. Gengenbach, 666 Lake Shore Drive, CHICAGO, ILL. . . . Frank F. Bodler, 804 Monadnock Bldg., SAN FRANCISCO, CALIF. . . . A. W. Arlin, Delta Bldg., LOS ANGELES, CALIF. . . . H. M. Euler Co., 133 S. W. First Ave., PORTLAND, OREGON . . . John R. Hayward, Liberty Trust Bldg., ROANOKE, VA. . . . G. F.Cotter Supply Co., 317 Union National Bank Bldg., HOUSTON, TEX. . . . E. A. Thornwell, 217 Whitehall St., S. W., ATLANTA, GEORGIA . . . W. G. Kaylor, Foreign Sales Dept., Heywood-Wakefield Co., 110 East 42nd St., NEW YORK, N.Y. . . . Railway & Power Eng. Corp., Ltd., TORONTO, ONTARIO; MONTREAL, P.Q.; WINNIPEG, MANITOBA; VANCOUVER, B. C.

JAL-TEN

A NEW HIGH TENSILE STEEL BY JONES & LAUGHLIN

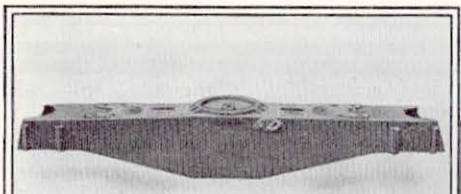
Jones & Laughlin Jal-Ten is a high tensile steel for car construction—a notable advance in product development based on the experience gained through 85 years of service to the Railroad Industry. Jal-Ten provides greater strength and reduced weight; it can be fabricated easily; and it is adaptable to any design and to the construction of any type of car. Full information on this new J & L product will be supplied on request.

OTHER J & L STEEL RAILWAY MATERIALS

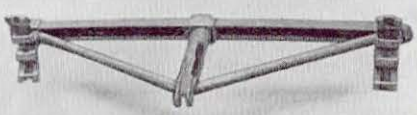
Plates, Shapes, Bars . . . Seamless Steel Boiler Tubes . . . Pipe, including copper-bearing pipe . . . Cold Finished Steel . . . Nails and Wire Products, including right-of-way fence . . . Reinforcing Bars . . . Piling . . . Fabricated Structurals . . . Pig Iron . . . Tie Plates . . . Track Spikes

J&L STEEL

JONES & LAUGHLIN STEEL CORPORATION
AMERICAN IRON AND STEEL WORKS
PITTSBURGH, PENNSYLVANIA



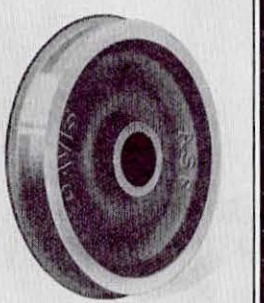
Truck Bolster



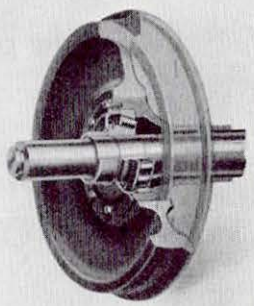
Ajax Brake Beam

THE American Steel Foundries for more than a third of a century has been developing cast steel devices, the use of which by the railroads has resulted in greater economy of operation.

Long experience in the manufacture of uniformly good steel castings, the combined skill of metallurgists and foundrymen familiar with the needs of railway and industrial equipment, prompt shipment from strategically located plants, a world wide reputation for integrity and fair dealing: — these are some of the things which have tended to make the American Steel Foundries a leader in the steel casting industry.

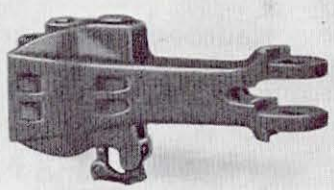


Davis Heavy Service Steel Wheel

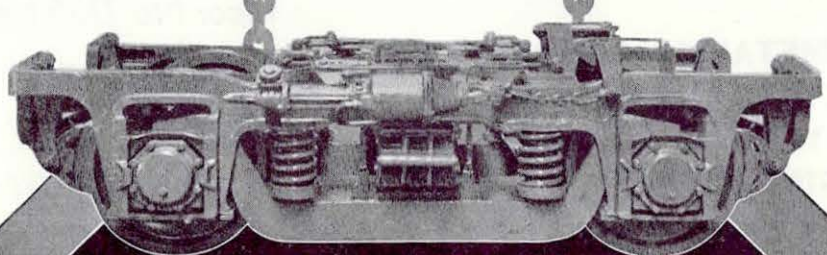


Roller Bearing Unit

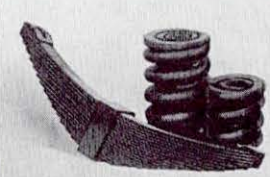
Cast Steel Truck Side Frame



Type "E" Coupler



Simplex Unit Cylinder Clasp Brake



Coil & Elliptic Springs

The American Steel Foundries is proud to be serving a transportation industry that demands the best inventive and producing talent and that reaches out for devices that are new and better.

Janney Vertical Key Yoke

AMERICAN STEEL FOUNDRIES

NEW YORK CHICAGO ST. LOUIS

PROOF OF PERFORMANCE

★ During the past year railroads ordered more than 10,000 Vapor Conduits,

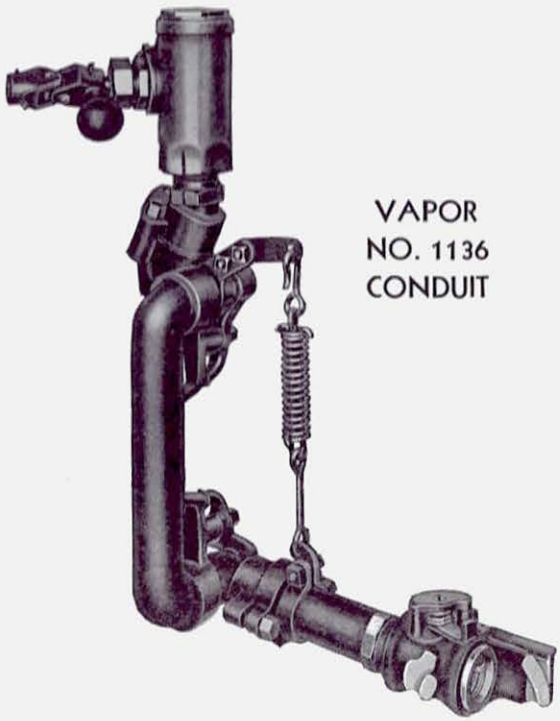
★ More than 60,000 VAPOR CAR STEAM CONDUITS in satisfactory service,

★ On over 93 Railroads,

★ Adopted as standard by additional Railroads after comparative tests.

★ New steam trains, Milwaukee "Hiawatha" and Northwestern "400," equipped throughout.

VAPOR METALLIC CONDUITS IN CAR SERVICE ARE PROVING THEIR WORTH IN STEADILY INCREASING DEMAND.



VAPOR NO. 1136 CONDUIT

Vapor No. 1136 Flexible Metallic Conduit under steam pressure has 50% less wearing friction than any other type of conduit.

STREAMLINE TRAINS

Vapor Steam Generator Unit with Heating System, Air Conditioning Control, and Extended Surface Radiation are proving their efficiency in every installation.

VAPOR CAR HEATING CO., INC.

RAILWAY EXCHANGE, CHICAGO, ILLINOIS

Built by American Locomotive Co.

HIGH-POWERED, STREAMLINED
for
HIGH SPEED PASSENGER SERVICE

To insure safe operation and economy in maintenance these locomotives are equipped with

COMMONWEALTH

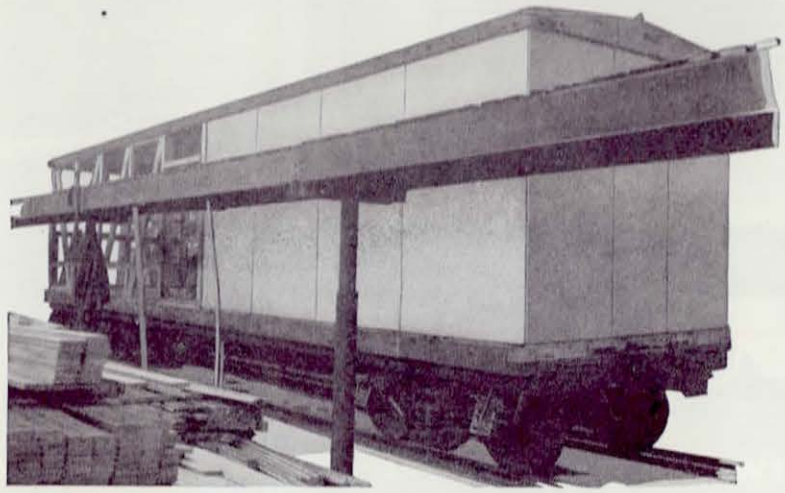
LOCOMOTIVE BEDS
FOUR-WHEEL ENGINE TRUCKS
DELTA TRAILER TRUCKS
"BOXPOK" DRIVING WHEELS
WATERBOTTOM TYPE TENDER FRAMES
SWING-MOTION TENDER TRUCKS

GENERAL STEEL CASTINGS CORPORATION

COMMONWEALTH PRODUCTS

EDDYSTONE, PA. GRANITE CITY, ILL.

American Refrigerator Transit Car Under Construction



IN CARS,
SHOPS, OR OFFICES

CELOTEX INSULATES against HEAT·COLD NOISE also BUILDS DECORATES

Preferred for
INTERIOR FINISH
SHEATHING
PLASTER BASE

CELOTEX has earned a decided preference among builders and users of modern refrigerator cars as a remarkably effective insulation.

Experience, derived from widespread use during the past twelve years, has demonstrated the value of this insulating building board made from the long, tough fibres of cane.

Lowered handling costs and reduced spoilage in transit result directly from the positive insulating efficiency of Celotex in the walls and ceilings of cars.

Celotex comes in board form in sheets of any size required by the car builder's own specifications.

Celotex possesses inherent strength. It resists strains, stresses and car weavings. It is light in weight, highly resistant to moisture, thoroughly sterilized. Keeps heat inside in winter, outside in summer.

A most important point to remember is that all Celotex Cane Fibre Products are manufactured under the Ferox Process (patented) and therefore effectively resist damage by Fungus Growth, Dry Rot and Termites (White Ants).

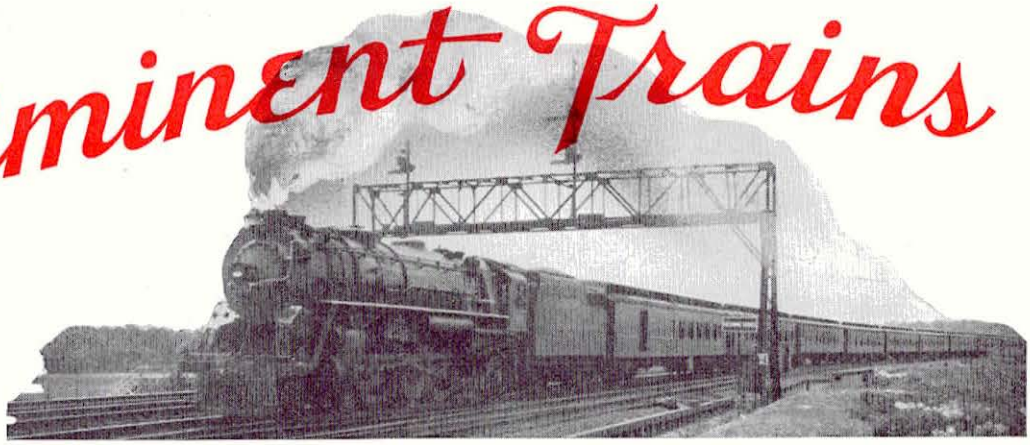
The Celotex organization is thoroughly experienced in the refrigerator car field. Comparative drawings and calculations showing weight, cost and insulating value of any form of refrigerator car construction, old or new, will be gladly supplied to any interested railroad or car builder on request. Write direct.

THE CELOTEX COMPANY
919 No. Michigan Ave. Chicago, Ill.

CELOTEX
BRAND
INSULATING CANE BOARD
Reg. U. S. Pat. Off.

BUILDS · INSULATES · DECORATES · SUBDUES NOISE

Preëminent Trains



- CAPITOL LIMITED
- THE CHIEF
- THE "400"
- GEORGE WASHINGTON
- GOLDEN STATE LIMITED
- OVERLAND LIMITED
- PANAMA LIMITED
- SUNSHINE SPECIAL
- TEXAS SPECIAL
- TWENTIETH CENTURY

3 out of 4 Extra Fare Trains Operating in the United States use

SPRING JOURNAL BOX PACKING

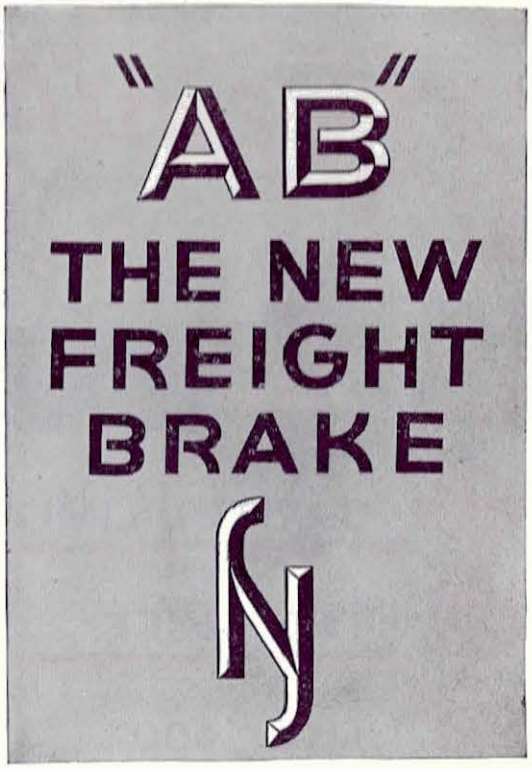
SPRING PACKING CORPORATION

310 So. MICHIGAN AVE. CHICAGO, ILLINOIS

Manufacturers

National Waste Company

Chicago - Philadelphia



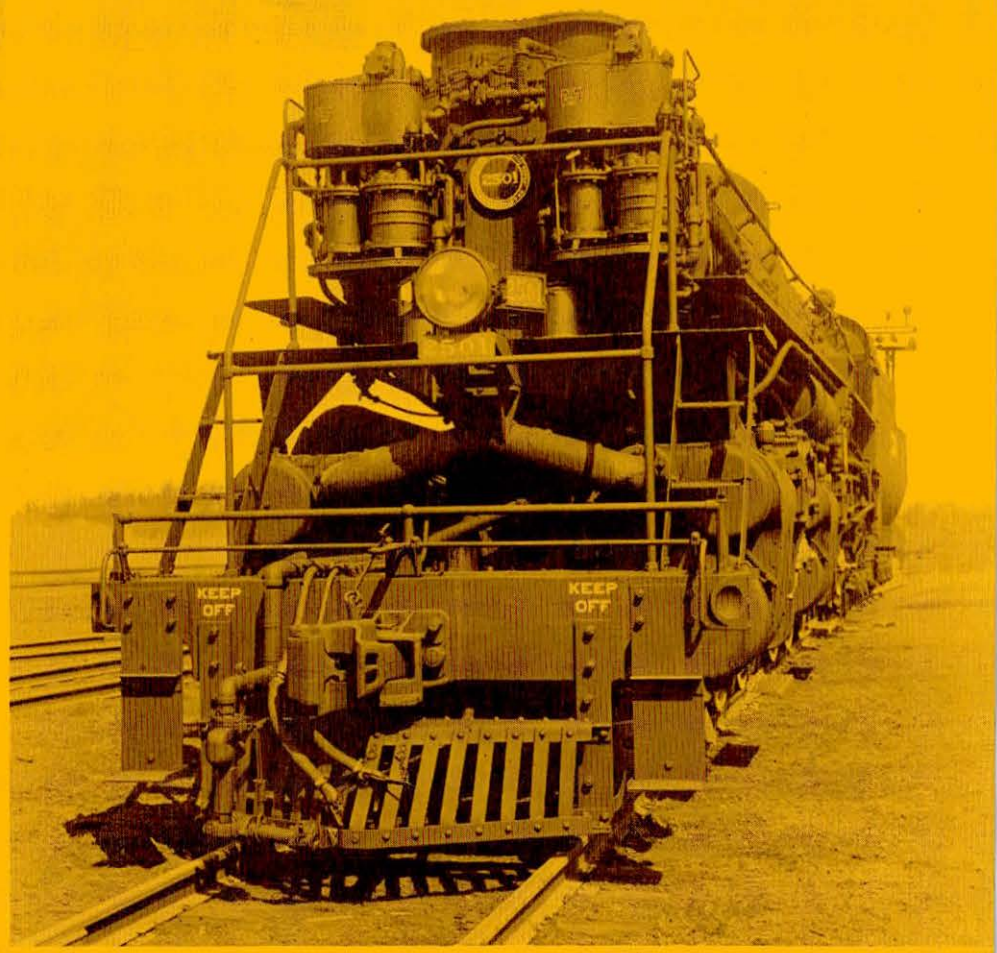
PRECISION
Prolongs Perfect Performance

"**AB**" BRAKES are the product of experienced craftsmen with a pride in their skill that will tolerate no compromise with exactness—every working part must conform to a Standard demanding the utmost in accuracy—That is one outstanding reason why "**AB**" Brakes will perform perfectly for long periods with no necessity for repairs—improved mechanism plus precision insures new efficiency—new economies.

The New York Air Brake Company

420 LEXINGTON AVENUE, NEW YORK CITY

PLANT: WATERTOWN, NEW YORK



THE five new single expansion articulated locomotives, 2-6-6-4 type, recently delivered to the Seaboard Air Line Railway are each equipped with 2 Nicholson Thermic Syphons in the firebox and 1 in the combustion chamber. Syphons add 102 square feet of most effective heating surface.

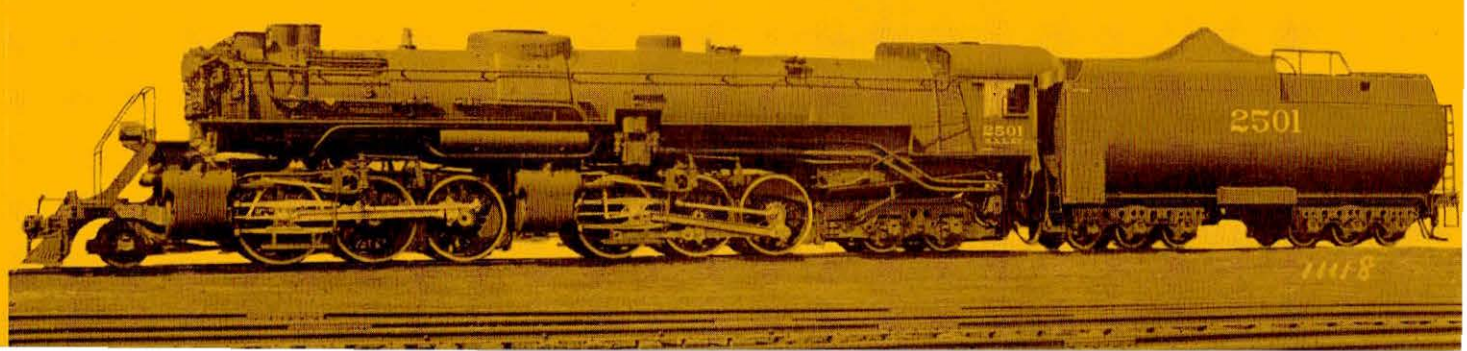
SYPHON EQUIPPED

Of Course

93% of the new steam locomotives ordered in the United States in 1934 were Syphon Equipped

Circulation • *Economy* • *Safety*

LOCOMOTIVE FIREBOX COMPANY
NEW YORK CHICAGO MONTREAL



Maintaining the Safety Factor

A maintenance superintendent recently stated, "In addition to the actual money saved on labor and material, we stop loss of metal. NO-OX-ID maintains the safety factor." All corrosion is stopped permanently. NO-OX-ID is easy to apply and to inspect. You can do 60% more bridge maintenance work without budget increase when NO-OX-ID is used. It will pay you to investigate the NO-OX-ID method of bridge maintenance.

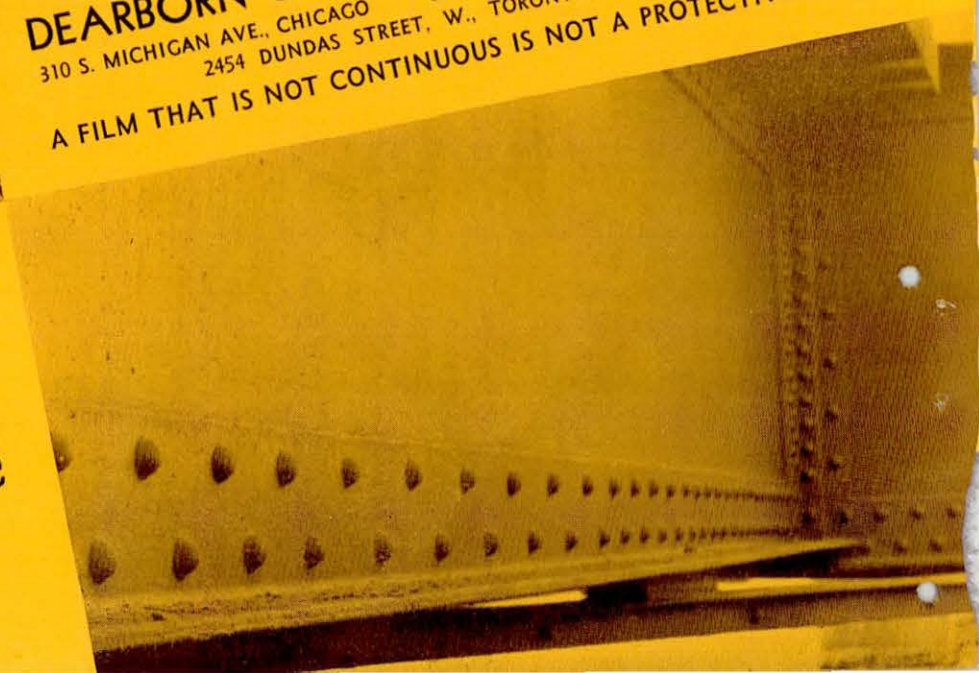
DEARBORN CHEMICAL COMPANY

310 S. MICHIGAN AVE., CHICAGO 205 E. 42nd ST., NEW YORK
2454 DUNDAS STREET, W., TORONTO

A FILM THAT IS NOT CONTINUOUS IS NOT A PROTECTIVE FILM

NO-OX-ID
IRON + OX = RUST
TRADE MARK

The Original Rust Preventive



MAGNUS METALS

For Service and Delivery

BRONZE ENGINE CASTINGS
SATCO LINING MATERIAL
CAR AND LOCOMOTIVE
JOURNAL BEARINGS

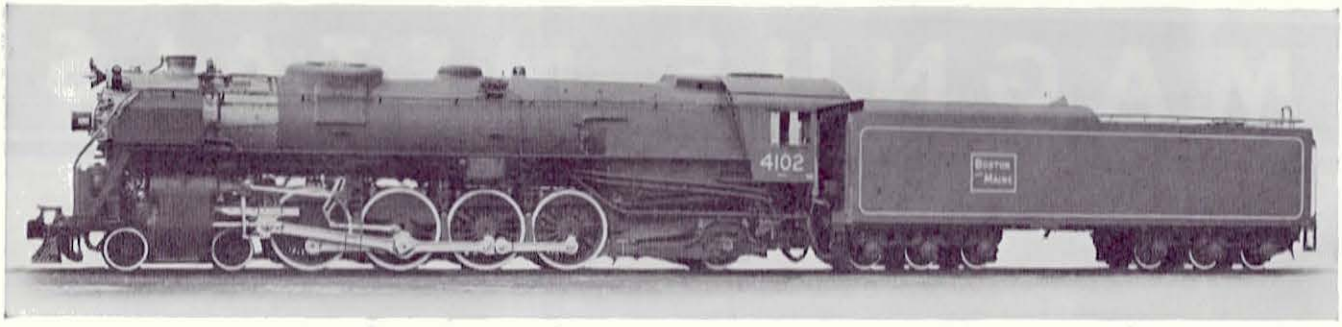
Where Records are Made
You Will Find Magnus Products

"MAGNUS PRODUCTS ARE BRASS INSURANCE"

MAGNUS JOURNAL BEARINGS
STAND UP UNDER
THE HEAVIEST LOADS

LINK THE RAILROADS AND THE DURABLE GOODS INDUSTRY

MAGNUS COMPANY INC.
CHICAGO NEW YORK



Mountain Type Locomotive for Freight and Passenger Service on the Boston and Maine.
Five of these were Built by Baldwin in 1935

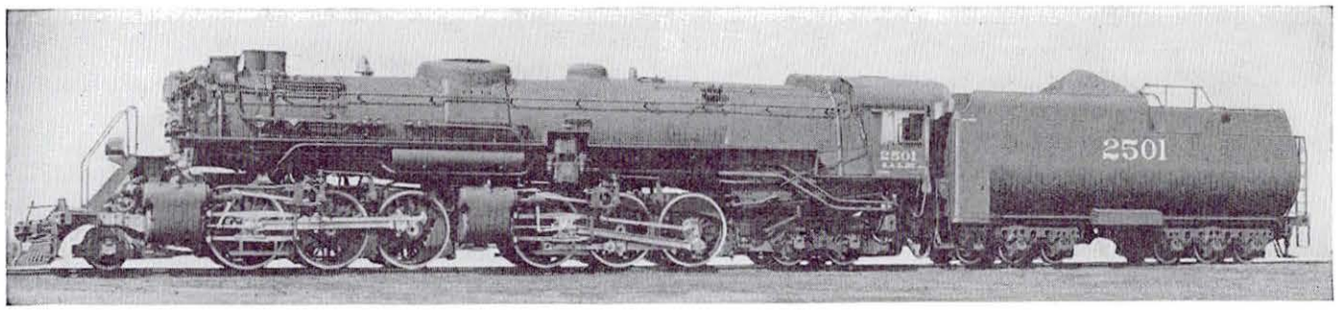
NEW POWER DELIVERED IN 1935

On these pages are depicted some of the modern locomotives which have been added to railroad inventories this year reflecting the great advancement made in steam locomotive design and manufacture during the past decade.

A modern locomotive is not simply another new locomotive. It is a superior motive power unit -- capable of more work at speed, rendering more dependable service, and still with such reductions in cost as to pay for itself in a few years.

It takes Modern Locomotives to make money these days!

THE BALDWIN



One of the Five Powerful 2-6-6-4 Type Articulated Locomotives. Built for the Seaboard Air Line in 1935

Lightening the dead-weight of tenders

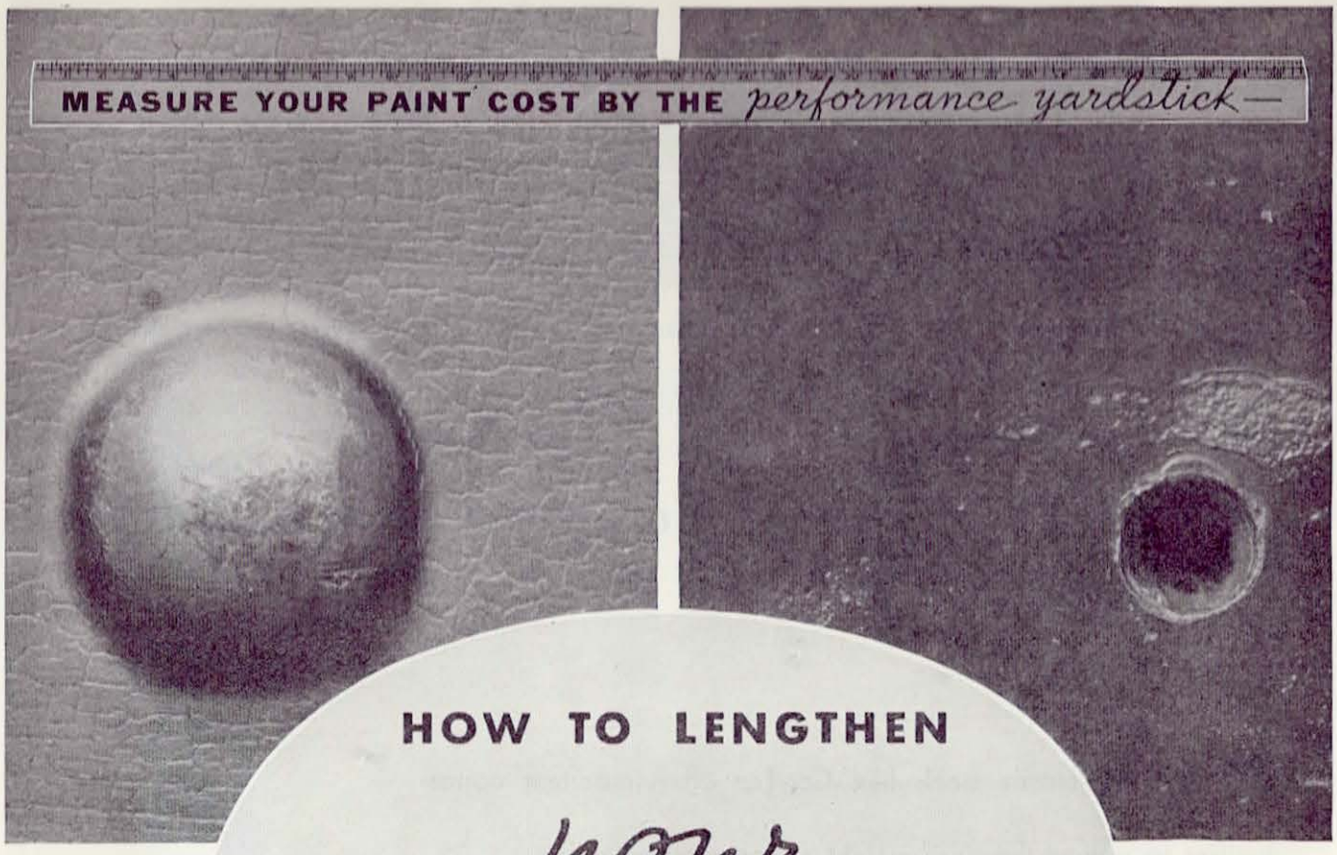
The new high-tensile steels like Cor-Ten offer important opportunities to reduce the dead-weight of locomotive tenders.

On one standard tender of an important railroad, with a capacity of 23 tons of coal and 22,000 gallons of water, we estimate that the dead-weight of the tender itself can be reduced about 10,900 lbs.—NEARLY 5½ TONS!

Or, where fuel and water capacities are inadequate, the reduction in the dead-weight of the tender itself may be turned into more fuel and water.

Why not look into this with us?

LOCOMOTIVE WORKS
PHILADELPHIA



Orthodox finish after 6½ years has failed by "checking" and "cracking." Photo enlargement 3 13/16 diameters.

Original Duco Finish after 8 years of service still retaining its gloss. (Lessor plate removed). Photo enlargement 3 13/16 diameters.

HOW TO LENGTHEN *your* SHOPPING SCHEDULES

YES, longer periods between shoppings are perfectly practical now. Duco and Dulux are scientifically designed to overcome the fundamental weaknesses of orthodox finishes which hitherto needed refinishing between 20 and 30 months at the most. Consider these advantages:

LONGER LIFE . . . made possible by an entirely different principle, developed by du Pont, in the manufacture of paint. Experiments have proven that Du Pont Railway Finishes last much longer than orthodox paints.

BETTER APPEARANCE . . . because the original gloss is retained longer, and because "checking" and "cracking" are eliminated.

GREATER PROTECTION . . . because Duco dries hard and hermetically seals the under coats against the deteriorating elements.

LESS EXPENSE . . . because reductions in frequency of shopping periods, in the number of days spent in the paint shop, and in refinishing costs per unit result in substantial savings per unit per year.

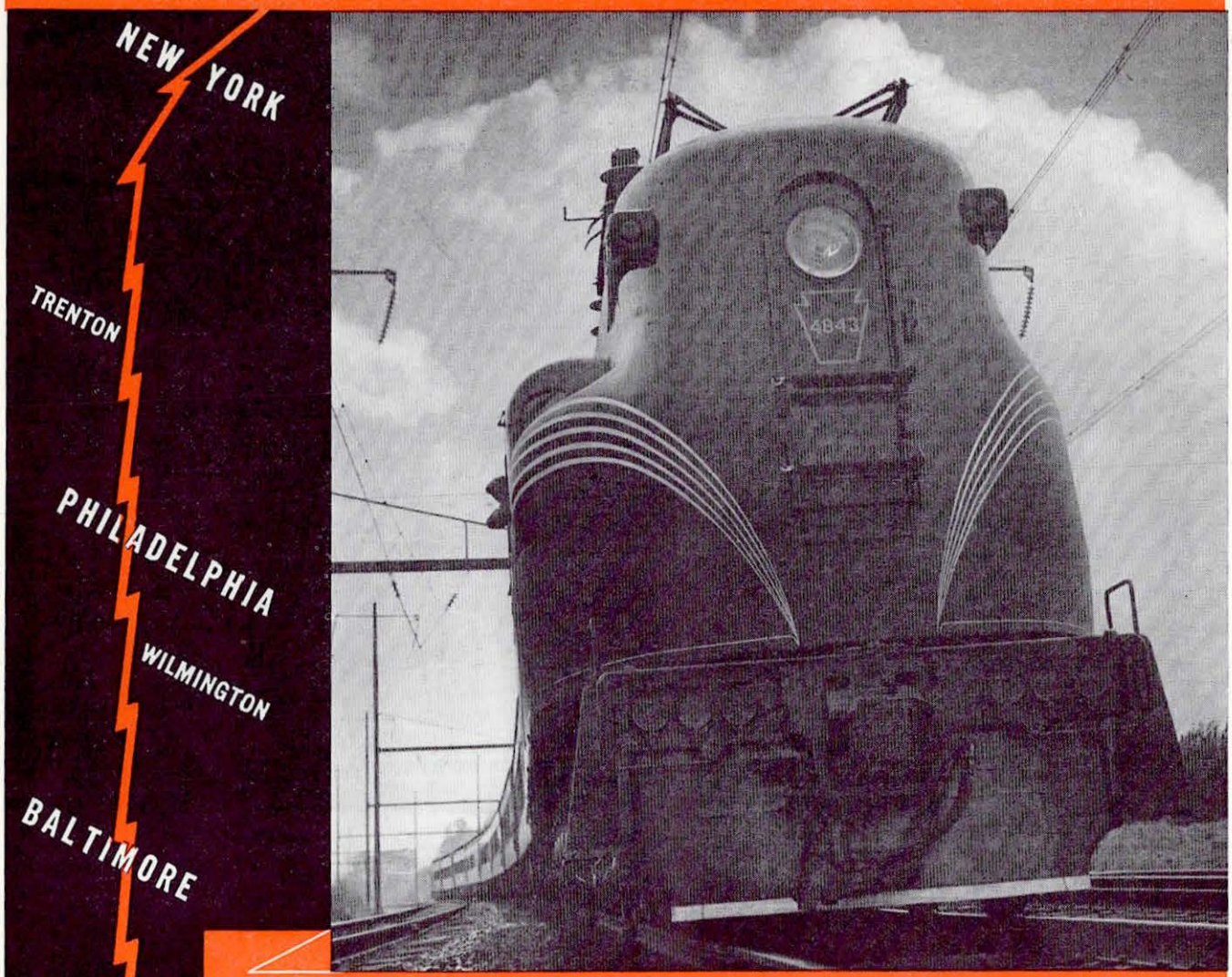
• • •

Ask one of our representatives to tell you more about the economy of using du Pont finishes. E. I. du Pont de Nemours & Co., Inc., Finishes Division, Wilmington, Delaware.

DU PONT
REG. U. S. PAT. OFF.

RAILWAY FINISHES

PENNSYLVANIA RAILROAD'S ELECTRIC HIGHWAY . . .



from the Heart of Manhattan to the Nation's Capital

. . . . a truly great project, consummated by fine cooperation between the Federal Government, a Steam Railroad and Industry. An Electric Highway, serving America's densest traffic, affording high speed mass transportation of passengers and freight between these two famous cities, on schedules unsurpassed by any other type of motive power. ◆Westinghouse is proud to have played so important a part in every phase of the Pennsylvania's complete electrification program since its beginning. Westinghouse has supplied for this program equipments comprising a total of 159 electric locomotives and 431 cars for multiple-unit service. Also, Westinghouse has furnished a large portion of the transformer, circuit breaker, switching and other substation equipment. ◆The excellent manufacturing facilities of Westinghouse have helped to make possible the early completion of electric service between Wilmington and Washington, the final link of this great Electric Highway.

PRR

W WESTINGHOUSE ELECTRIC

57 NEW STREAMLINERS
Cut Running Time on the Electric Highway

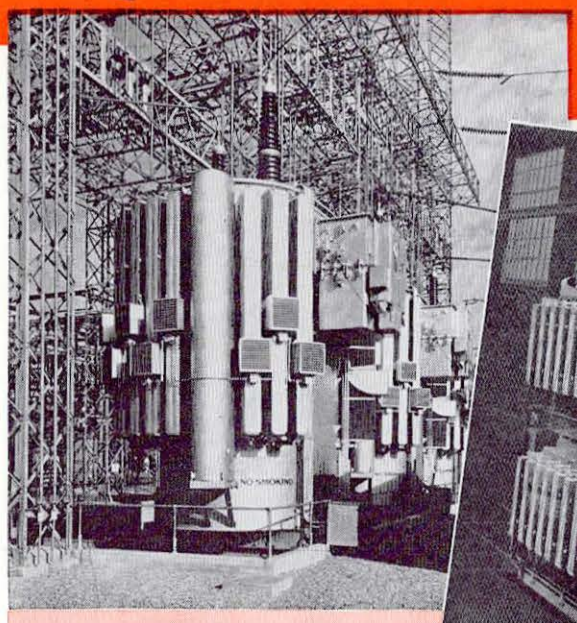
34 *are Westinghouse Equipped . . .*

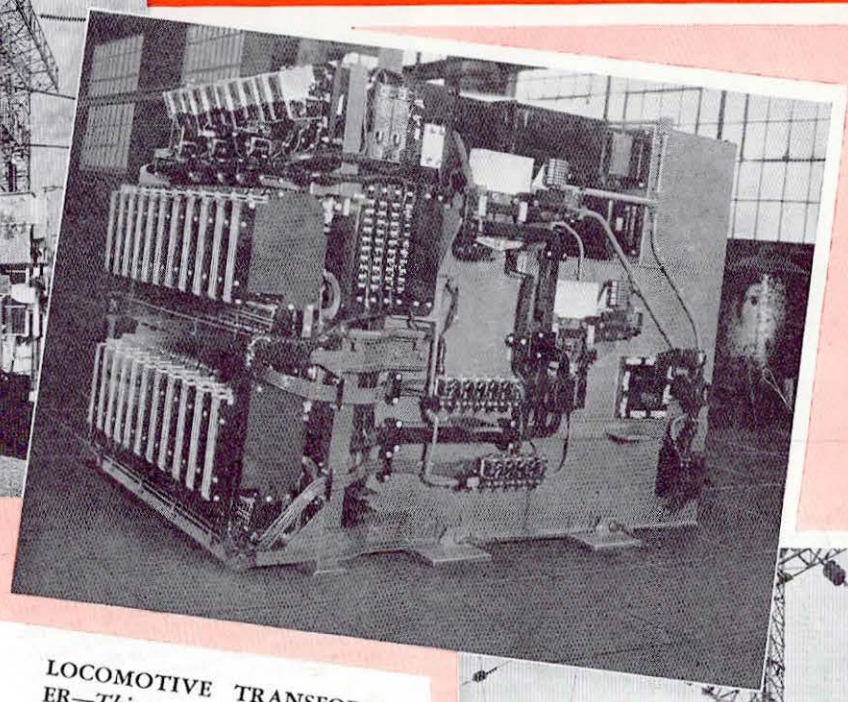
For high-speed through passenger service over the Electric Highway, new electric locomotives were necessary. After a careful study, locomotive designs were accepted and orders placed for 57 new streamline locomotives, the most powerful of their type ever built. ◆Immediately, large Westinghouse aisles were turned over exclusively for rush production. Specially designed machines and skilled mechanics did the rest. Thus, delivery of Westinghouse equipment for 34 of these locomotives was made in record time. ◆Outstanding engineering together with precision in workmanship and materials assure to the Pennsylvania, locomotives that will perform year after year, with operating economies unsurpassed by any other type of motive power. ◆With the majority of these streamline locomotives now in service, schedule time over the 226 miles between Washington and New York is less than four hours.

Westinghouse

THESE TRANSFORMERS

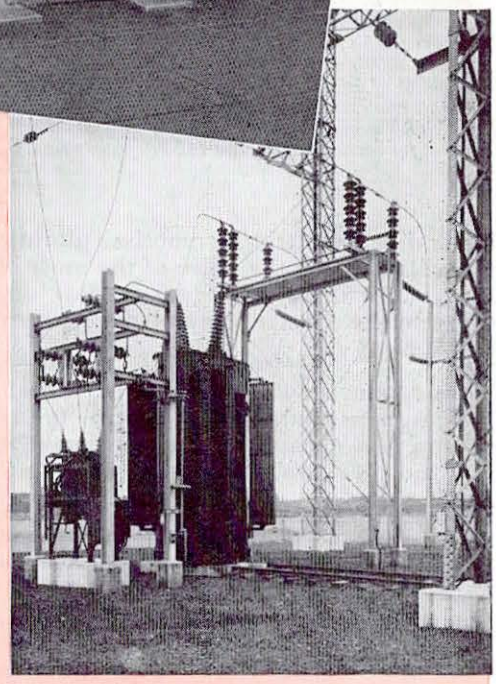
Help assure Reliability of Service···on the Electric Highway





POWER STATION TRANSFORMER—*The first transformation of the electricity that finally reaches the locomotive motors takes place at the power plant. Here, huge transformers receive the electricity from the power supply stations and send it over the transmission lines to the P. R. R. substation transformers.*

LOCOMOTIVE TRANSFORMER—*This transformer was developed specifically for the new streamlined locomotives used on the Electric Highway. Of relatively small dimensions and light weight, it delivers a flow of steady, unfailing power to the driving motors.*



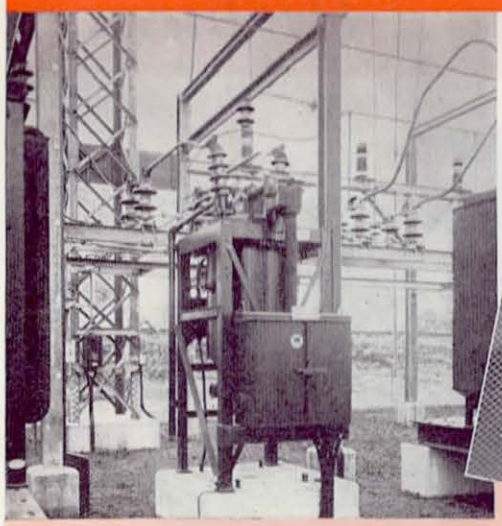
On the new Electric Highway, Westinghouse transformers help assure a reliable power supply. From the power plant to the locomotive motor, these transformers aid in maintaining a flow of steady, unfailing electricity, day in and day out. ◆Almost half a century of transformer development, engineering research, and manufacturing experience make this reliable performance possible. ◆Westinghouse is proud of the part the transformers shown on this page play in the epoch-making development of the Electric Highway.

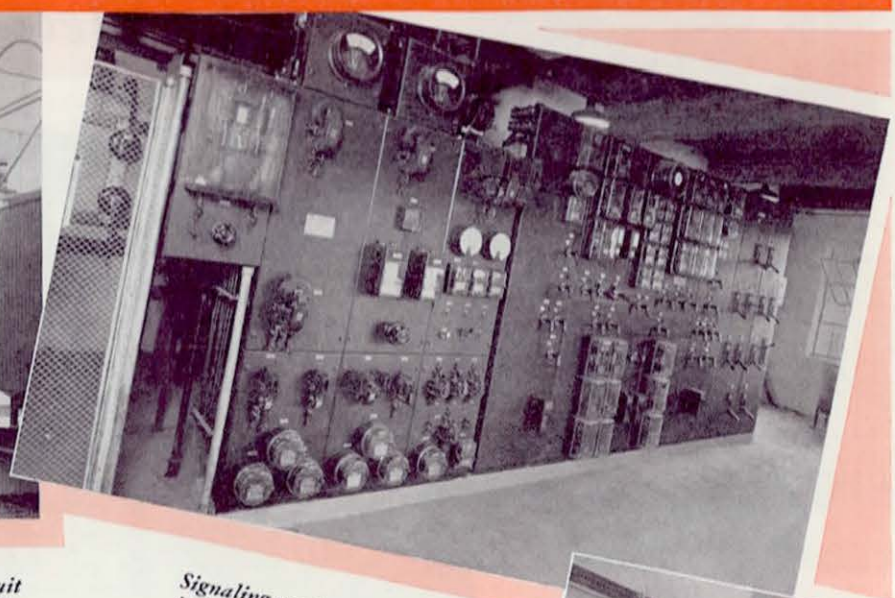
R.R. SUBSTATION TRANSFORMER— *Transformers like this take the high-voltage electricity from the railroad's high lines and transfer it to the trolley wires at 11,000 volts. Of sturdy construction, these 4500 kv-a. transformers assure unfailing service year in and year out. They fulfill the outstanding railroad creed "Continuity of Service".*

THUS, FROM THE POWER PLANT TO THE LOCOMOTIVE MOTOR, WESTINGHOUSE TRANSFORMERS HELP ASSURE A STEADY, UNFAILING SUPPLY OF ELECTRICITY THAT ENABLES THE RAILROAD TO MAINTAIN AN UNEXCELLED RELIABILITY OF TRAIN SERVICE.

Westinghouse

Helping to Maintain
"ON TIME" SCHEDULES
on the Electric Highway





Westinghouse "De-ion" Grid oil circuit breakers help assure all-important continuity of service. Pictured above is a 34.5 kv., 1500-ampere, 25-cycle bus tie breaker. Others include 5000-ampere, 15 kv., 25-cycle breakers capable of interrupting 2½ million kv-a. for use at power supply points and 161 kv. breakers with a rupturing capacity of 2½ million kv-a. for sectionalizing the 132 kv. power line.

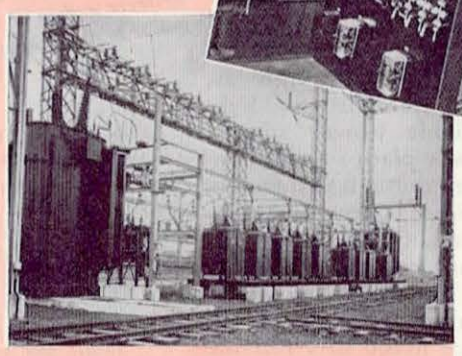
Signaling equipment can be controlled from either the substations (above) or tower control rooms (right) through switchboards and signal control boards. Faster, safer service is thus made possible. Westinghouse supplied practically all of this equipment.

Streamlined electric locomotives gliding swiftly down the rails quicken the pulse of the most blasé observer. But equally important to successful "on time" operation are the substations and circuit breakers that dot the right-of-way.

Westinghouse switchboards for signal control and Westinghouse supervisory control for centralized operation of a group of substations make more economical, more efficient, and faster service possible.

High-speed "De-ion" circuit breakers protect trolley feeders against overloads and short circuits which might seriously damage contact lines and car equipment. Other Westinghouse breakers at power supply points assure all-important continuity of service.

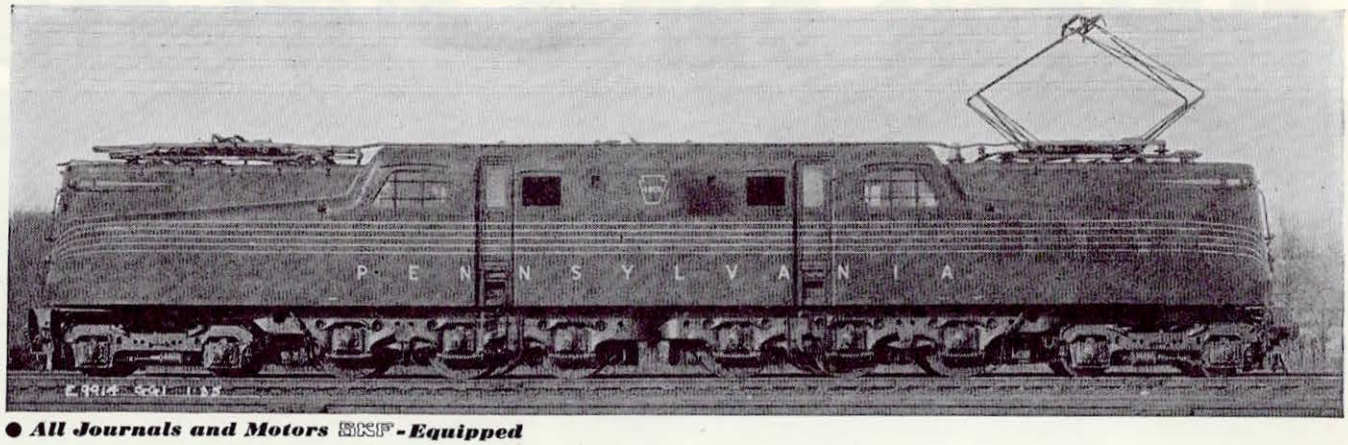
And so, at every point Westinghouse equipment functions swiftly, smoothly, reliably, to safeguard equipment and assure "on time" schedules over this great Electric Highway.



High-speed "De-ion" circuit breakers which effectively interrupt short circuits within .04 of a second, fully protect contact lines and car equipment from damage due to overloads or short circuit conditions.

R 89035

Westinghouse



● *All Journals and Motors* SKF*-Equipped*

Speed..Modernism..with SKF

Today's speed and economy records on all types of railroad power are being made on SKF-equipped units—Hiawatha on the Milwaukee, Electrics on the Pennsylvania, and Diesels on the Union Pacific.

Designers of modern railroad equipment instinctively turn to SKF Bearings—they KNOW these bearings "can take it"—because the records show over 15 years of proven bearing performance in railroad service!

There is an increasing trend toward SKF Journal Bearings for drivers, leading trucks, trailing trucks and tender trucks. Investigate the exclusive Self-Aligning features of SKF Spherical Roller Bearings and the inherent good qualities built into these bearings, and you, too, will join the parade.

SKF INDUSTRIES, INC., Front St. & Erie Ave., Philadelphia, Pa.

● *All Driving Axles and Engine Trucks* SKF*-Equipped*

SKF
JOURNAL BEARINGS

3451

ELECTRIC DRIVE PUTS THE

DIESEL TO WORK ON THE RAILROAD

"In all this development, the fact should not be lost sight of that the place of the Diesel engine in any form of railroad traction service, be it switching, freight, or high-speed passenger, is possible only because of the electric transmission"—RAILWAY ELECTRICAL ENGINEER, April, 1935.

POTENTIALLY, the Diesel engine is one of the biggest money savers that ever came to the railroads. It converts fuel into engine horsepower at the surprisingly high efficiency of 30 to 35 per cent. Being an internal-combustion engine, it requires no boiler, no firebox. But its many advantages for railroad service have been capitalized through electric drive.

Electric drive takes the power of the engine and delivers it, SMOOTHLY, to the wheels. It makes this power flexible and simplifies the control. It has led the way to higher engine speeds—making possible the use of light-weight, compact Diesels in railway service. And for this service, it has added the one important advantage that the Diesel, by itself, lacks—tremendous tractive effort for starting and accelerating.

Thus, the combination of the Diesel engine and electric drive gives, for many situations, the best unit of railroad motive power ever built.

Its fuel cost is from 1/5 to 1/3 that of steam power.

It eliminates water, coal, and ash-handling facilities.

It has high availability.

It reduces motive-power maintenance very materially.

It cuts track maintenance.

It can be built in small units of horsepower (very important in small, light-weight, streamlined trains).

It has full horsepower available for accelerating as well as for high-speed running.

It can be maintained with existing railroad-shop facilities.

Let General Electric engineers discuss these points with you—help you determine where Diesel-electric motive power will build traffic and reduce costs on your system. General Electric, Schenectady, N. Y.

250-13

9 of the 11 Streamlined Articulated Trains Have G-E Electric Drive

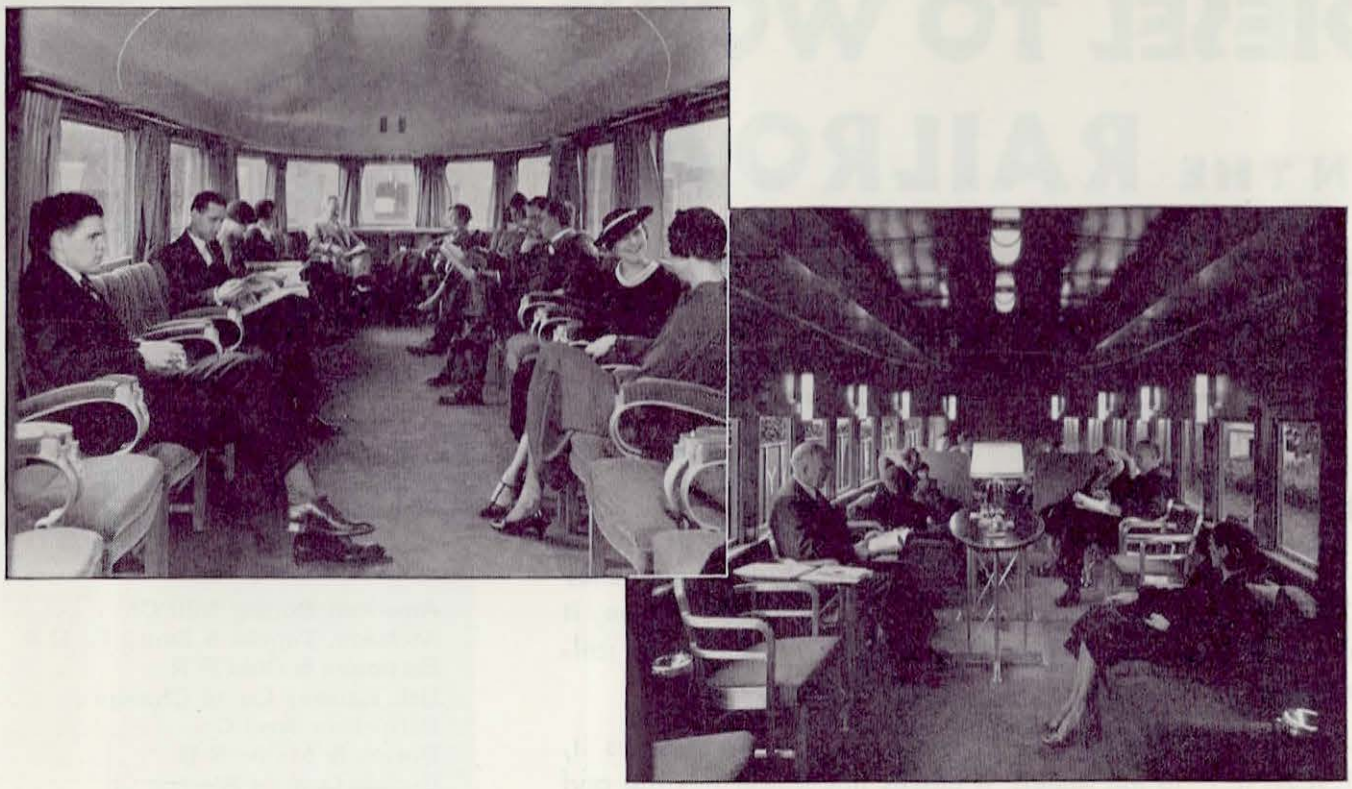
Burlington 4-car
Union Pacific 7-car
Boston & Maine 3-car
Burlington 3-car
Burlington 3-car
Union Pacific 11-car
Union Pacific 11-car
Illinois Central 5-car
Burlington 4-car

80% of the Diesel-electric Locomotives Have G-E Electric Drive

American Rolling Mill Co.	9
Atchison, Topeka & Santa Fe R.R.	2
Baltimore & Ohio R.R.	2
Belt Railway Co. of Chicago	4
Bethlehem Steel Co.	1
Boston & Maine R.R.	2
Buffalo General Electric Co.	1
Bush Terminal Co.	7
Canadian National Railways	1
Central R.R. of New Jersey	1
Chicago, Burlington & Quincy R.R.	3
Chicago & North Western Ry.	4
Chicago, Rock Island & Pacific R.R.	1
Delaware, Lackawanna & Western R.R.	20
Erie Railroad	5
Foley Brothers	1
Ford Motor Co.	2
Great Northern R.R.	1
Hoboken Manufacturers R.R.	2
Illinois Central R.R.	9
Ingersoll-Rand Co.	1
Jay Street Connecting Ry.	1
Lehigh Valley R.R.	6
Long Island R.R.	2
Michigan Central R.R.	4
New York Central R.R.	41
New York, New Haven & Hartford	1
Reading Company	2
Red River Lumber Co.	1
Republic Steel Corp.	4
Union Carbide Co.	1
U.S. Navy Dept.	4

Two Thirds of the Gas-electric Rail Motor Cars Have G-E Electric Drive

GENERAL ELECTRIC



Quiet the roar of railroad travel— increase passenger comfort

METALS carry sound vibrations with almost the ease that they conduct an electric current. Car frames and window sash, as well as wall, floor and roof structures, all carry to the passengers the outside roar of travel unless properly insulated against sound. This sound deadening can be accomplished with the same materials used to insulate against heat and cold, if proper care is used in their selection and application. Most of the new high speed, air conditioned trains have selected the insulating materials manufactured by the American Hair & Felt Co. and Dry-Zero Corporation. In operation, these new trains, even at extreme speeds, are amazingly quiet and comfortable for passengers. Over a period of many years, these affiliated companies have supplied the vast majority of insulation in passenger and refrigerator cars for both American and Canadian railroads.

HAIRINSUL	Standard refrigerator car insulation
DRY-ZERO	The most efficient and lightest weight low temperature insulation known—standard for low temperature cars
SALAMANDER	For over 30 years the standard insulation for passenger cars
LIGHT-WEIGHT SALAMANDER	For insulating light-weight, high speed passenger cars
CARINSUL	Made especially for insulating the letter board of passenger cars
OZITE STANDARD HAIR FELT	Made by the genuine original platen or felted process and universally recognized as the highest standard of felted insulation
LIGHT-WEIGHT AIR CONDITIONING HAIR FELT	For insulating air ducts
DRY-ZERO ECONOMY ICE BLANKET	For reducing ice meltage in storage houses, on platforms and in cars in transit.

AMERICAN HAIR & FELT COMPANY—DRY-ZERO CORPORATION

(Railroad Division)

Merchandise Mart **Chicago**

Authorized Sales Agents:

Johns-Manville Sales Corporation **Union Asbestos & Rubber Co.**

Wherever Railroads Run

Single Service Chilled Tread Wheels Carry Traffic to All Parts of the American Continent—

MEMBERS

Albany Car Wheel Co.
American Car & Fdry. Co.
Bass Fdry. & Machine Co.
Canada Iron Foundries, Ltd.
Canadian Car & Fdry. Co.
Central Car Wheel Co.
Cleveland Production Co.
Dominion Wheel & Fdries., Ltd.
Griffin Wheel Co.
Hannibal Car Wheel & Fdry. Co.
Lobdell Car Wheel Co.
Louisville Car Wheel & Ry. Sup. Co.
Marshall Car Wheel & Fdry. Co.
Maryland Car Wheel Co.
Mt. Vernon Car Mfg. Co.
New York Car Wheel Co.
Pullman-Standard Car Mfg. Co.
Ramapo Fdry. & Wheel Works
Reading Car Wheel Co.
Southern Wheel Co.
Tredegar Iron Works

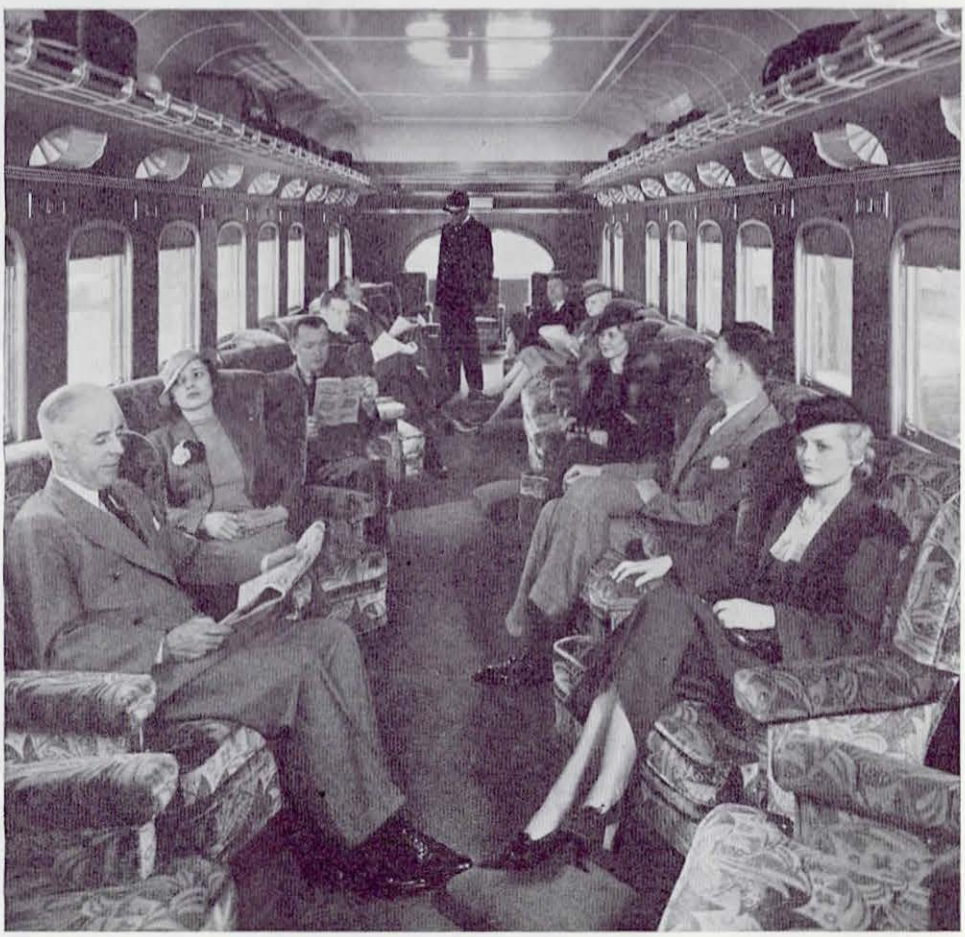
ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS

332 SO. MICHIGAN AVE. CHICAGO, ILLINOIS

For the Hiawatha

VELMO

highly-patterned upholsteries



HIAWATHA—*the name spells romance and color!*

The Milwaukee Road is rightly proud of its new air-conditioned, beautifully decorated train. And we are equally proud that Velmo was chosen as the colorful and decorative upholstery fabric for the Hiawatha.

Goodall-Sanford Industries have woven Velmo upholsteries for railroad equipment for many years. They have proved with these modern Velmos that beauty means no sacrifice of those prime upholstery requisites . . . cleanliness, sturdiness, easy-riding, economy. Velmo offers new designs for every transportation need, in the *quality* it has been supplying American railroads since 1882.

• • •

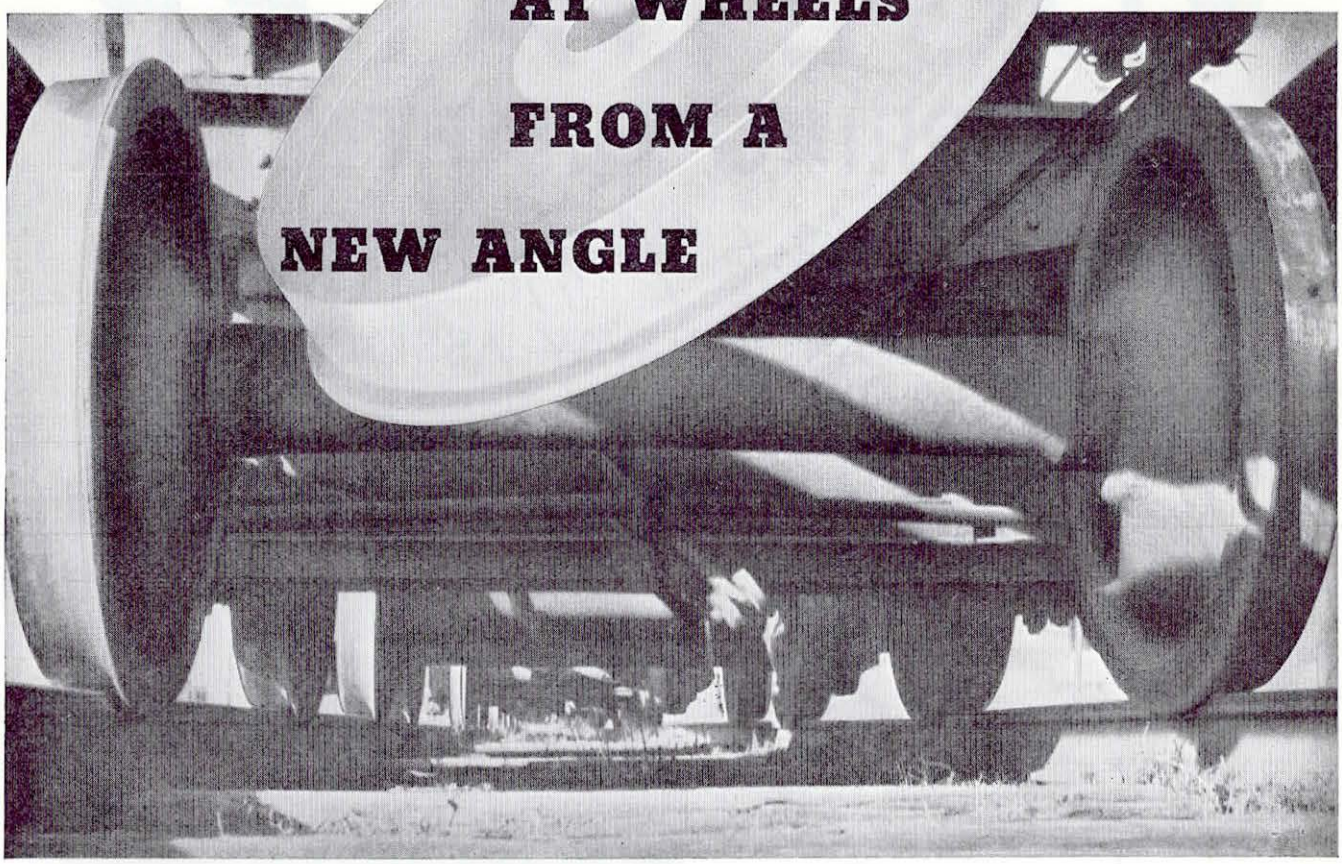
L. C. CHASE & COMPANY, INC., *selling division of Goodall-Sanford Industries,* 295 Fifth Ave., N. Y.
Boston Chicago Detroit San Francisco

VELMO MOHAIR VELVET
GOODALL MOHAIRS

Goodall-Sanford
INDUSTRIES

SEAMLOC BROADLOOM CARPET
LEATHERWOVE COATED FABRIC

LOOKING AT WHEELS FROM A NEW ANGLE



Freight no longer travels at the leisurely rate of past years. Stepped-up schedules closely approach those of passenger service. Wheels, bearing the brunt of increased speed, must be considered from this new angle. Wheel standards must be stepped-up with schedules. • Carnegie Wrought Steel Wheels meet these new requirements. They have long been accepted as the standard of excellence in passenger service. They have convincingly demonstrated their safety under high speed—their stamina under heavy loads. For freight service Carnegie Wrought Steel Wheels are available in one-wear and multiple-life types. They merit serious consideration.

CARNEGIE WHEELS

328

Product of CARNEGIE STEEL COMPANY • PITTSBURGH *Also* ILLINOIS STEEL COMPANY • CHICAGO

United States Steel Corporation Subsidiaries

LIGHT WEIGHT WROUGHT STEEL

The EDGEWATER RING SPRING DRAFT GEAR

Awarded Certificate of Approval by the AMERICAN RAILWAY ASSOCIATION

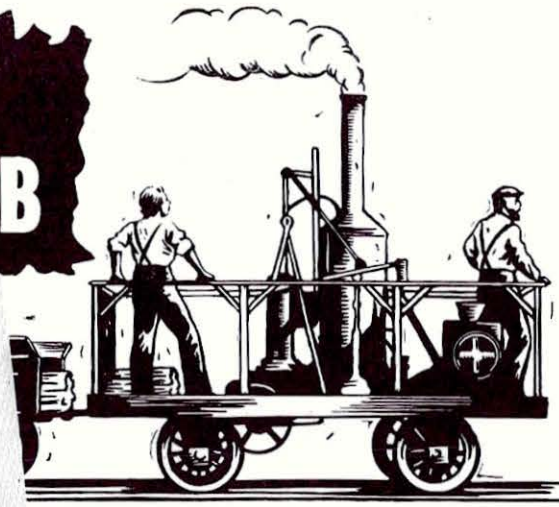
AMERICAN RAILWAY ASSOCIATION
DIVISION V—MECHANICAL
COUPLER AND DRAFT GEAR COMMITTEE
Certificate of Approval for Draft Gear
Number SEVEN
Manufacturer EDGEWATER STEEL COMPANY
Type Designation of Draft Gear
EDGEWATER TYPE B-32-KA
Date of Certificate JUNE 20, 1933
Issued under A. R. A. 1931
This certificate is evidence that the Coupler and D
mittee of Division V, Mechanical, American Railway
tested the above type of draft gear and approves it as
gear specifications of the American Railway Associatio
effect at this date. Appended hereto, and forming part o
for the purpose of identification, are photographs and
this type of gear.
Certified report of test of this gear, dated 6-10-33
in the office of the Secretary of Division V, Mechanical, Americ
way Association.
American Railway Association
Division V, Mechanical
Secretary
B-32-KA

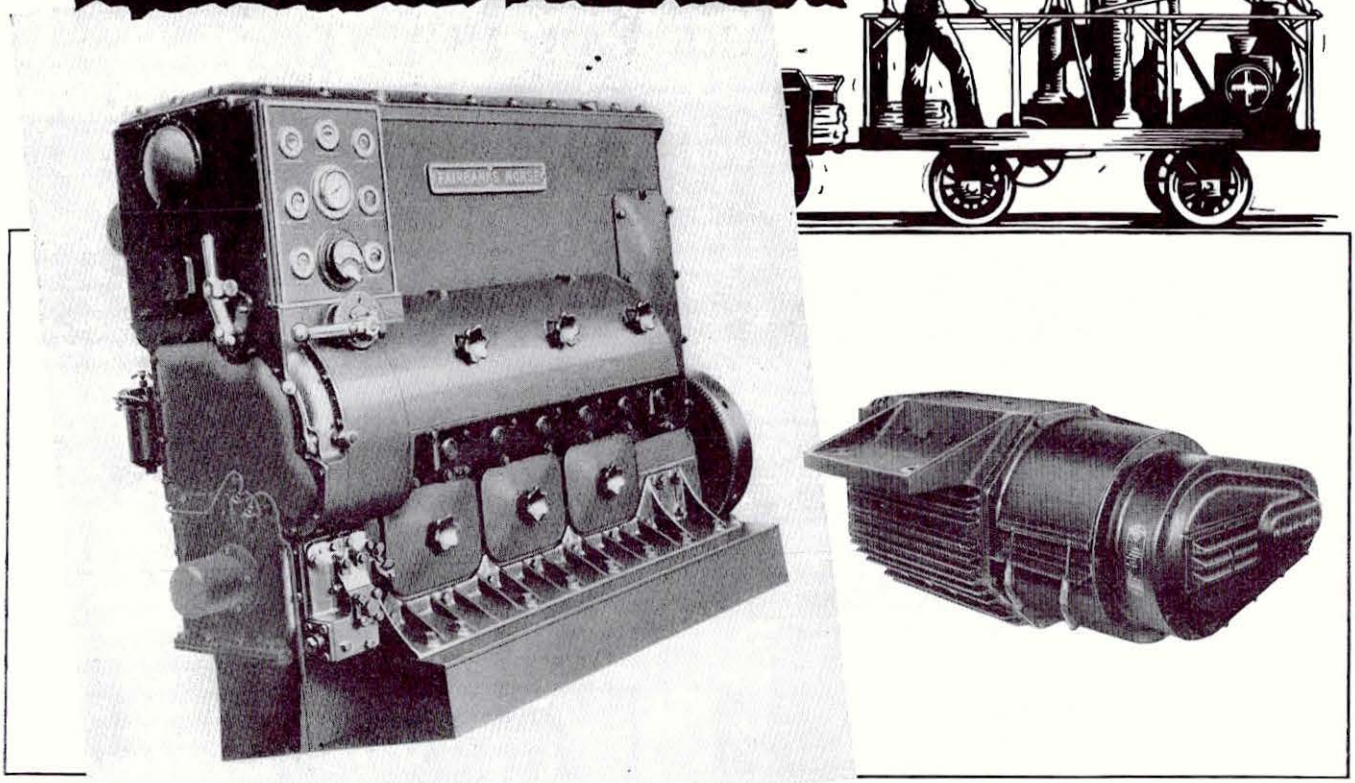
EDGEWATER STEEL COMPANY

PITTSBURGH PENNSYLVANIA

Atlanta Boston Kansas City New York Portland
Baltimore Chicago Louisville Philadelphia San Francisco
St. Louis Seattle St. Paul Washington

SINCE THE DAYS OF THE TOM THUMB





F-M 40-volt controlled voltage axle generator

F-M opposed piston two-cycle high speed Diesel

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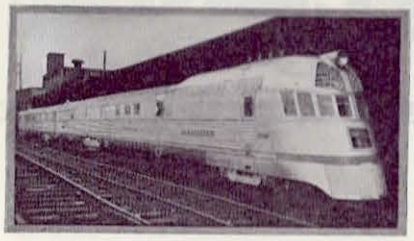

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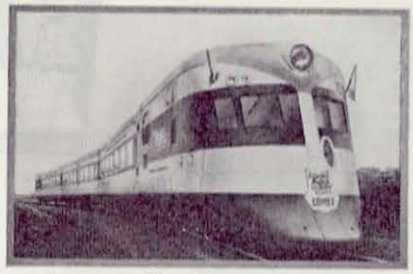

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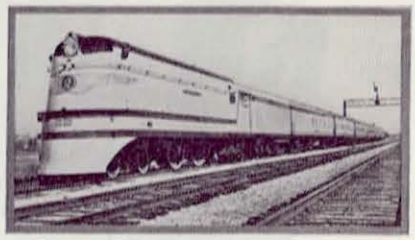

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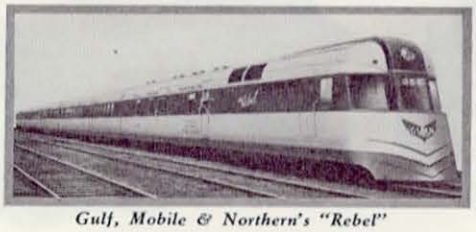

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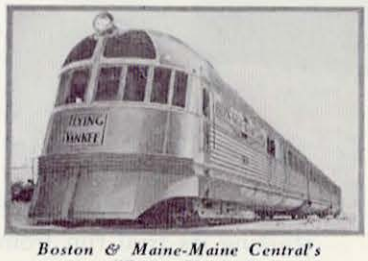

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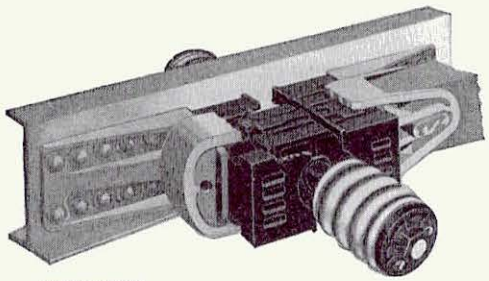

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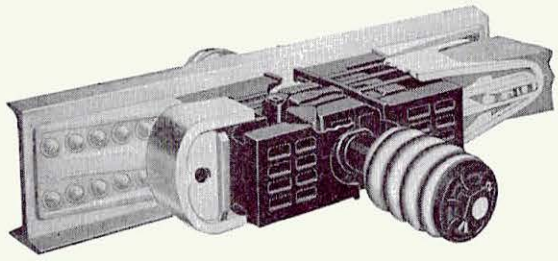

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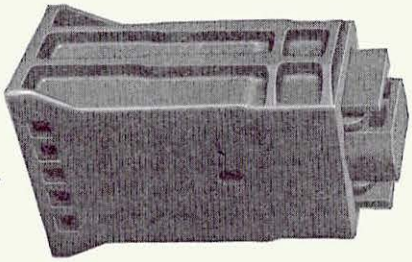

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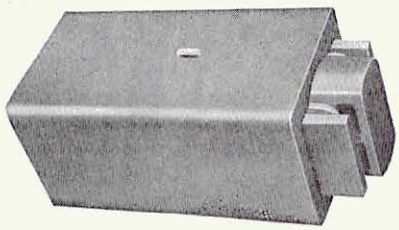

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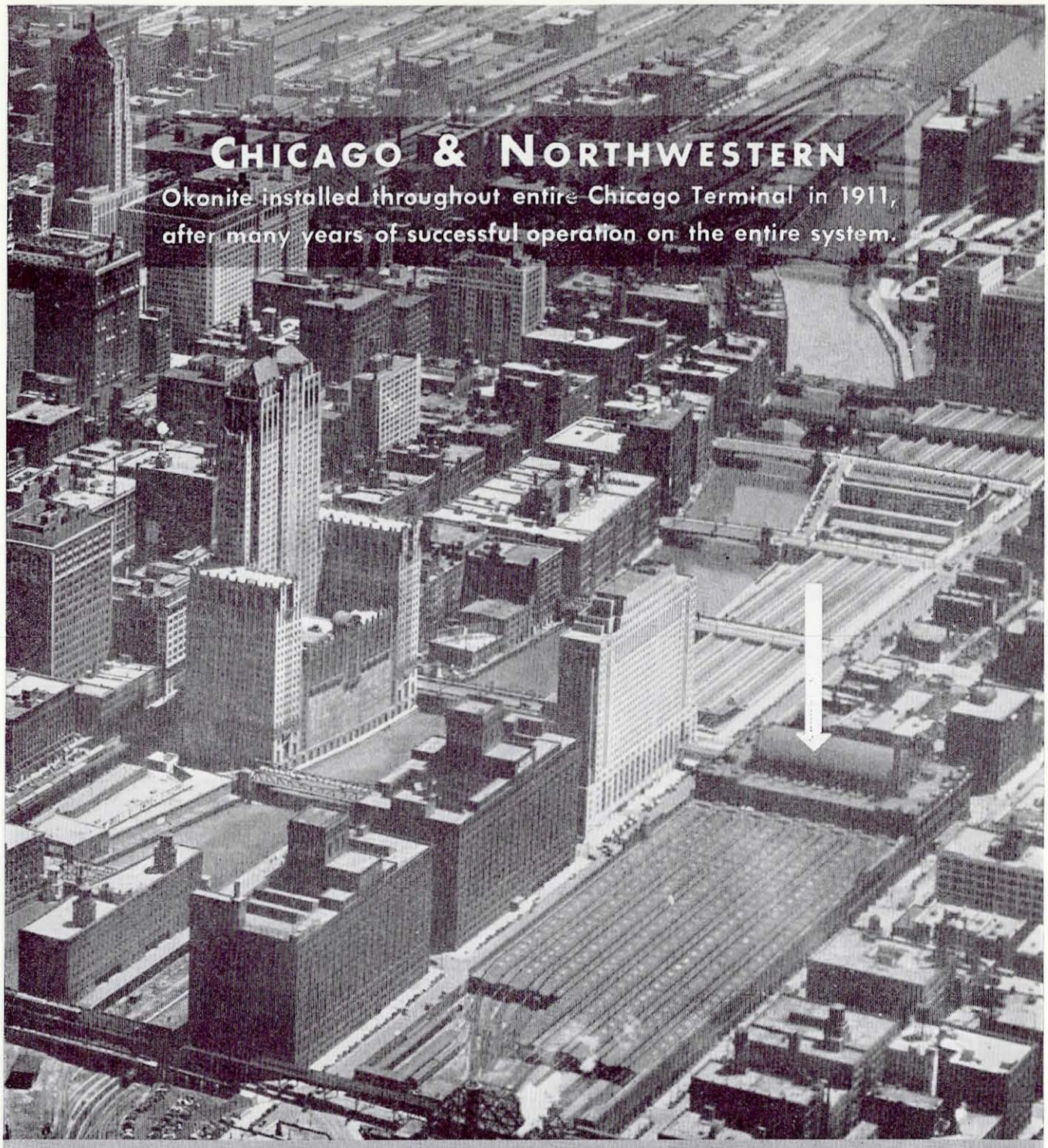
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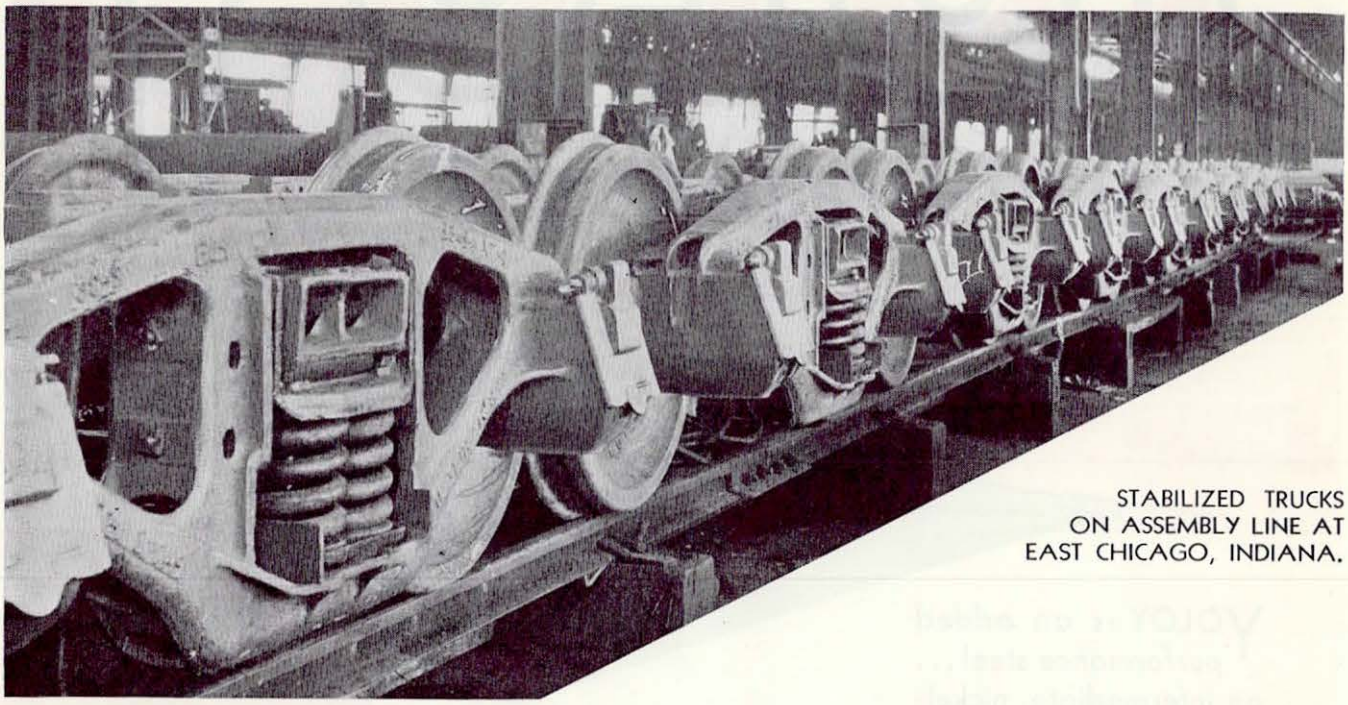

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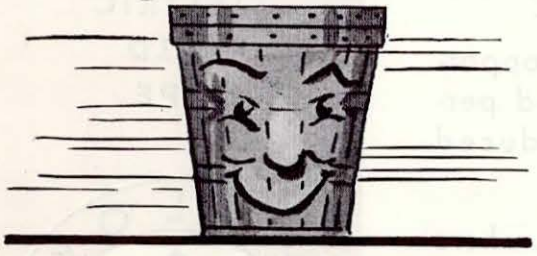

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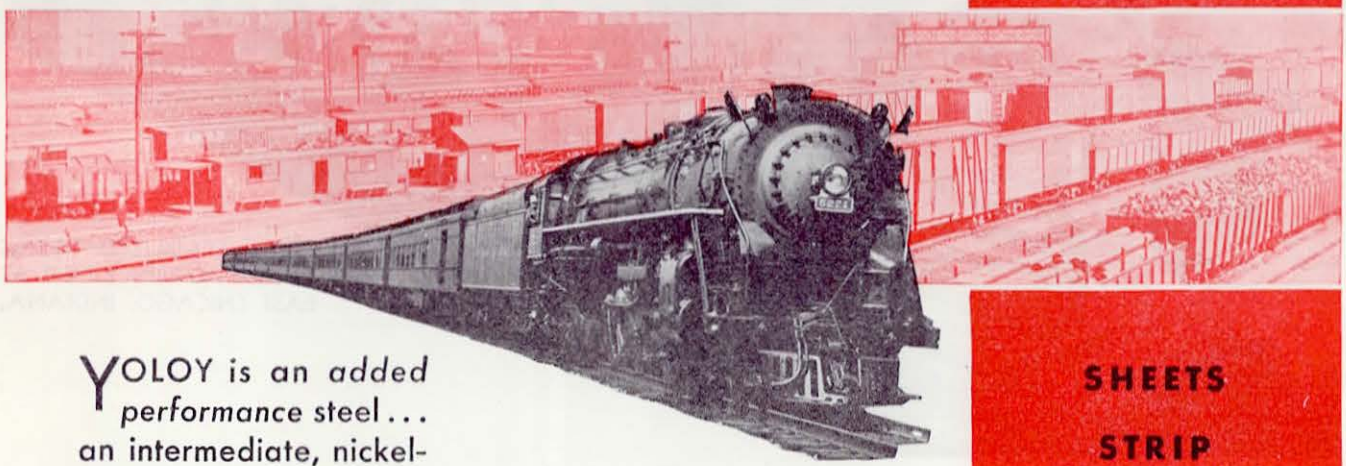

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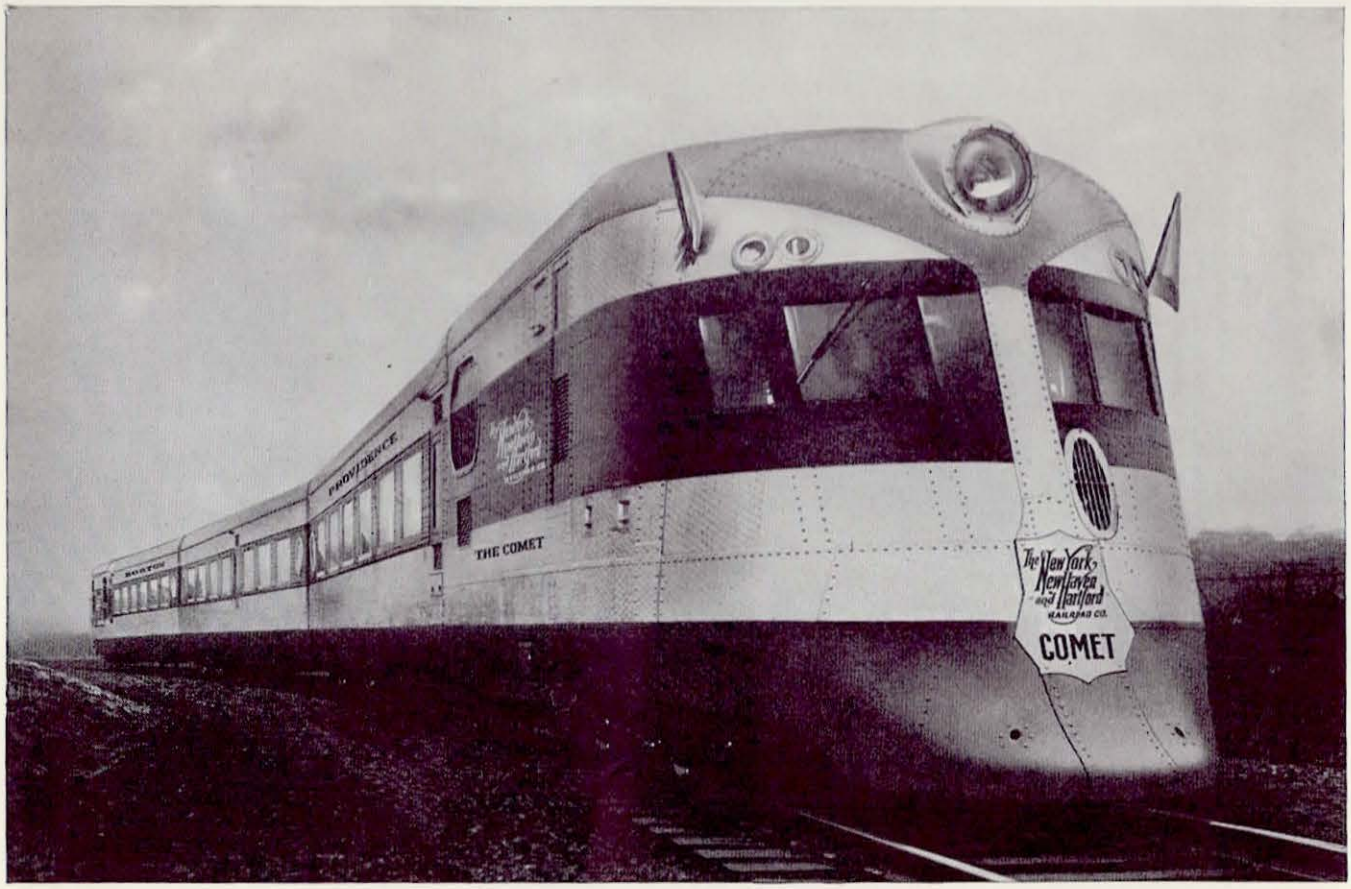

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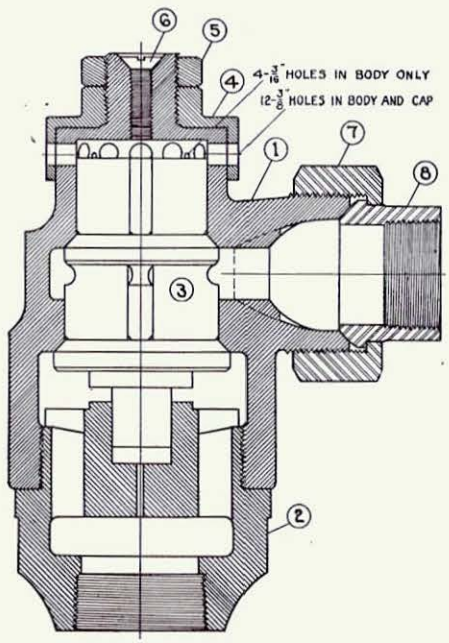

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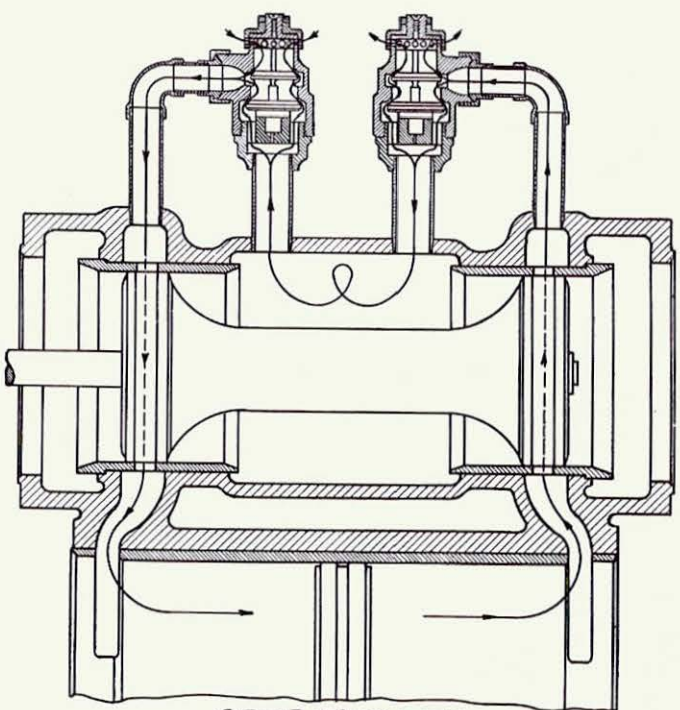

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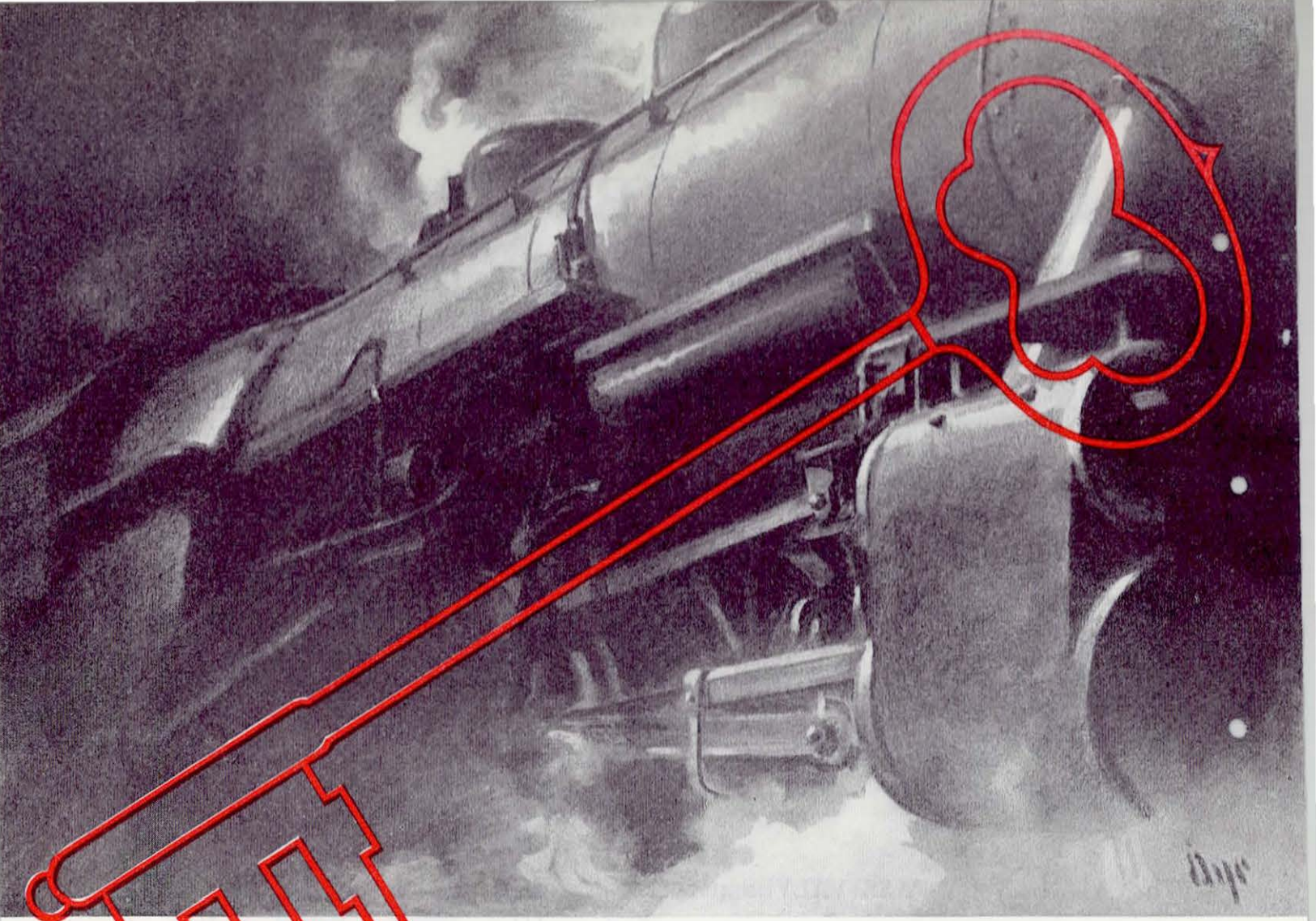

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Railway Age

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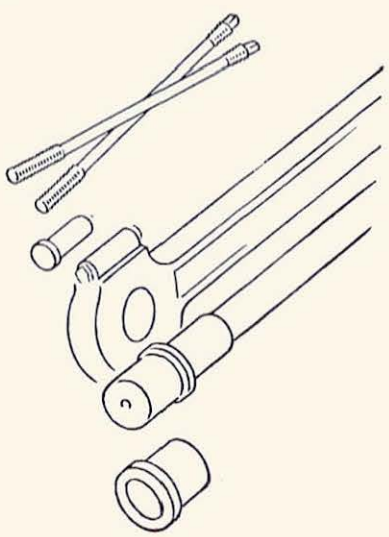
TO MECHANICAL OFFICIALS

Who are fighting high maintenance costs



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RAILWAY AGE

A Situation Demanding Leadership

Under a capitalistic economic system, such as prevails in this country, the function and duty of maintaining or restoring prosperity are principally those of business leadership, not of government. Under both the Hoover and Roosevelt administrations the government has undertaken principally to perform this function and duty, and it has not been successful. The actual management of business is still in the hands of owners of private capital and of business executives that the owners of capital supposedly or actually select. Government can handicap or help them by regulation and taxation; but as long as private ownership and management prevail, the maintenance or revival of prosperity cannot be principally accomplished by government.

What has been said in public by numerous business leaders since the decision of the Supreme Court in the N.R.A. case raises a question as to whether they understand the economic conditions and problems with which the country is confronted, and the function and duty of business leaders under a capitalistic system, and intend to take advantage of the decision to perform this function and duty. The decision affords better opportunity than has existed for two years for them to do the things to revive business that they alone can do.

Business Leaders and Durable Goods Problem

From many high business sources have come declarations that the standards of unfair competition, hours of work and wages established by N.R.A. codes should and will be maintained. What are the motive and purpose of these declarations? What effect upon general business would be produced by carrying them out? Many business leaders have claimed that N.R.A. was a bad thing for business. If so, how could virtual carrying out the N.R.A. codes be a good thing for business? Would it constitute the best possible performance of the function and duty of business leadership under the economic and political conditions that now confront the system of capitalism in this country?

There is virtual unanimity among students of the present situation, whether economists or business men, that the paramount cause of the continuance of depression and unemployment is the continuance of lack of buying of durable goods. Does it not follow that, to terminate the depression, it is essential for business as well as government to adopt whatever policies will help to restore normal buying of such goods? Excepting automobiles, five-sixths of all durable goods are bought by business. Is not, then, the crux of the problem of recovery the determination and adoption of means which will increase business buying of durable goods? If so, the real test of the wisdom of maintaining all or any of the competitive and other standards of the N.R.A. codes seems to be whether this policy will handicap or stimulate business buying of durable goods. We have read no recent declaration from any high business source, that this is, or should be, the test applied; but it would seem that the most important declarations that could come from such sources would be in regard to this vital matter.

Railways and Durable Goods Industries

The railroads have been normally, and still are potentially, among the largest buyers of durable goods. Therefore, what is necessary to stimulate their buying of them undoubtedly is illustrative of what is necessary to stimulate buying of them by other industries. Railroad buying can be stimulated temporarily by borrowing from the government for that purpose; but in the long run its volume is determined by current and prospective net operating income. The net operating income of the railways has been curtailed ever since midsummer 1933 by failure of their traffic to increase, and by advances in the prices they have to pay for equipment, materials and fuel. These advances in prices have been mainly attributable to increases in the production costs of manufacturers and fuel producers due principally to advances of hourly wages caused by N.R.A. Throughout the last year railway net operating income has been curtailed also by the advances in railway wages made on July 1, 1934, and on January 1 and April 1, 1935. Railway net operating income in 1934 was about $12,000,000 smaller than in 1933, in spite of an increase in gross earnings. It was $24,000,000 less in the first four months of 1935 than in the first four months of 1934. Net operating income must be largely increased if there is to be a lasting increase of railway buying.

What, then, are the business leaders of the country—including railway executives—going to do to increase railway net operating income? If they are not going to do anything for this purpose, then they are not going to do anything to contribute toward revival of the durable goods industries to the extent that an increase of railroad buying would help to revive them. If business leaders are not going to do anything definite and constructive to stimulate railway buying from the durable goods industries, then, presumably, they are not going to do anything definite and constructive to stimulate other business buying from them. If this is the case, it follows that business leadership is not going to do

the most important things it could to end the depression. If business leadership is not going to do anything definite and constructive to end the depression, should it criticise government for failure to do so, or even for policies that tend to protract it?

The Way Out of Depression

The ways to increase the net operating income of the railways, and thereby their buying, are plain. The state and national governments should adopt measures to equalize the terms of competition between the railways and other carriers. Railway executives should take the steps necessary to reduce railway labor costs to a basis consistent with current transportation and economic conditions. But other industries have made advances in hourly wages and prices which, by hindering increased production of durable goods, have hindered increase of railway traffic and gross earnings, and which have also increased railway operating expenses, the resultant being the curtailment of railway net earnings and buying power already emphasized. Therefore, the problem of increasing railway net earnings is not one that concerns and should be attacked by railway managements alone.

The same thing is true of the problem of increasing the net earnings, and thereby the buying power, of public utilities and other large purchasers of durable goods. It is a problem of leadership in every line of industry, commerce and finance, because its solution is required to revive the durable goods industries, and their revival is absolutely essential to full recovery, reemployment, abolition of relief rolls, reduction of government expenditures and avoidance of uncontrollable inflation. It seems obviously to follow that business leadership in every line should resolve to do whatever it can do to revive the buying of durable goods, and should adopt whatever policies will contribute toward accomplishment of that objective, whether in accordance with N.R.A. standards or not. Most impartial and competent students of the present economic situation agree that maintenance of N.R.A. standards in many industries and rapid revival of the durable goods industries are incompatible.

What Are Business Leaders for?

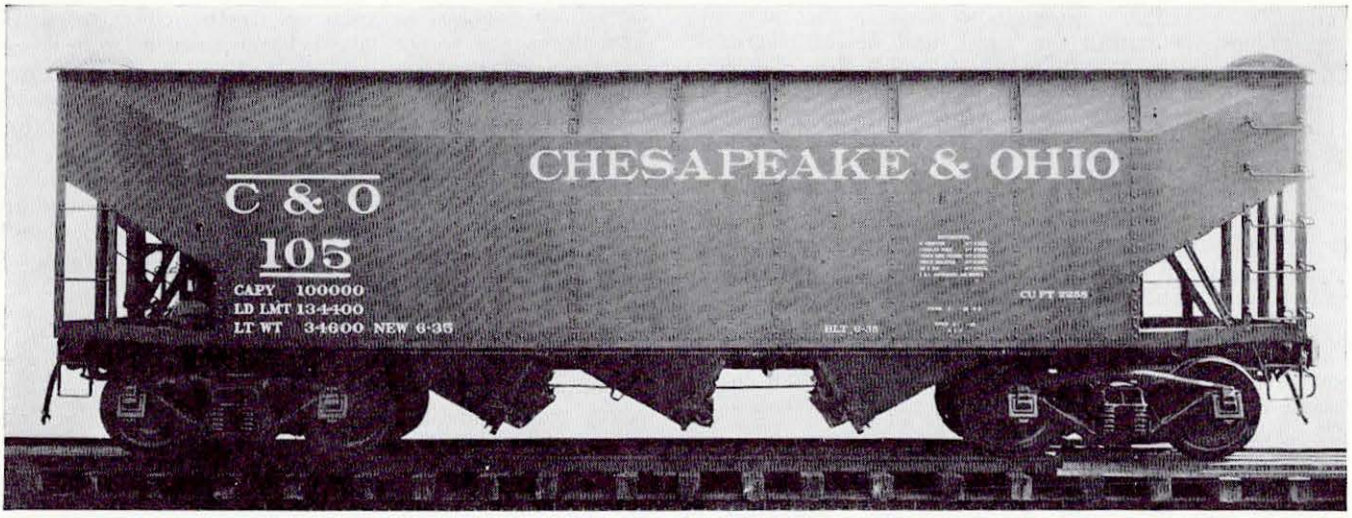
It is quite natural that business executives should hesitate to face squarely the issues presented. It is quite natural that leaders in each industry should hope that leaders in other industries will first take the economic bull by the horns, and thereby spare them the risk and odium of first doing things that may cause serious trouble and be temporarily unpopular. It is not pleasant for anybody to contemplate the struggle and turmoil that may be caused by real efforts to make the readjustments necessary to revive business. But how long can our capitalistic system survive under conditions which result in millions of persons remaining unemployed and government spending billions annually for relief? What are men given positions of business leadership under the capitalistic system for, if not to attack with ability and courage, not merely in public discussion, but in the actual conduct of business, the economic problems that develop under that system? Under state socialism it would be the function and duty of government officers to solve all economic problems. Under the capitalistic system it is mainly the function and duty of business leaders. To whatever extent they fail efficiently and effectively to perform the function and duty they have voluntarily assumed they furnish the strongest possible arguments for abolishing capitalism.

We do not contend that there should be general reductions of wages and prices. Conditions differ in different industries. One thing is certain, however: Throughout the almost two years that the country had N.R.A. the total volume of production and commerce did not increase as it did increase during the last one-third of 1932 and the second quarter of 1933 before N.R.A. became effective. In fact, it hardly increased at all, while it was largely increasing in most other countries. It must follow that policies different from those that have prevailed during the last two years must be adopted by government, or business, or both, if general business is to improve. Business cannot afford to have those who should be its leaders continue to "pass the buck" to government in future as they have been doing recently. The Supreme Court's decisions in the N.R.A. and other cases have destroyed some of the government's most important economic policies and given business a much better opportunity than it has had for two years to show what it can do to revive itself under greatly reduced government interference.

How to Defend Capitalism

If business leaders do not take advantage of the opportunity now afforded them to so attack present economic problems as to promote the public interest by increasing production and reducing unemployment, they will open wider than ever the breach in the wall of capitalism through which its enemies are trying to enter for the purpose of destroying it. There seems reason for apprehension lest many business leaders are declaring for the policies that they are in the hope of retaining apparent advantages for their own industries gained under N.R.A. at the expense of other industries. The present economic and political situation has an importance that should cause complete subordination of such temporary and minor considerations.

The only way largely and lastingly to increase profits and curtail taxes in any industry is to revive every kind of business. The first essential to reviving every kind of business is revival of production and employment in the durable goods industries. A business leadership that knows so little about economics that it does not know this is true, or that is too timid intelligently and courageously to attack the vital problems that it envisages, is not the kind of leadership required to maintain and operate a capitalistic system of production, distribution and finance.



Chesapeake & Ohio Light-Weight Hopper Car Designed to Carry 67 Tons of Coal

C. & O. Light-Weight Hopper Car Has Many New Features

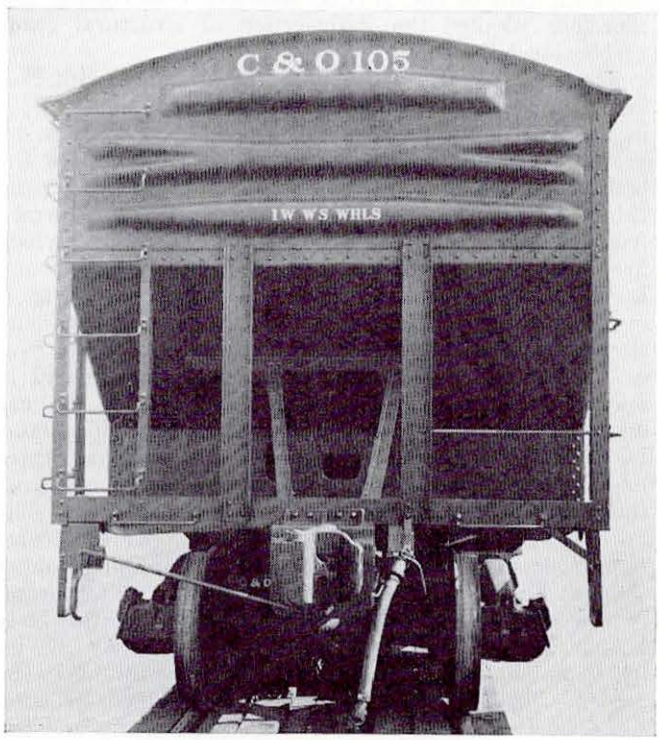
Built by the American Car and Foundry Company largely of Cor-Ten and Man-Ten Steels—Car has a revenue load to gross weight ratio of 79.5

A NEW design of light-weight, heavy-duty hopper car, built for the Chesapeake & Ohio by the American Car & Foundry Company, was exhibited at Chicago this week in connection with the annual meeting of the Mechanical Division of the Association of American Railroads. Features have been incorporated in this car which have never before been used in freight cars for general interchange service. This car is one of a lot of 10 built largely of high-tensile, Cor-Ten and Man-Ten steels. The railroad intends to put these cars into regular service, to obtain definite data as to the relative performance of cars built of these materials compared with cars of ordinary low-carbon or copper-bearing steel.

In preparing the design three objectives were given special attention: First, to adapt the equipment to the particular conditions and requirements of service on the Chesapeake & Ohio; second, to afford an opportunity for tests, under actual service conditions, of new materials and appliances; and, third, to include the latest developments and standards in those features which are not of special construction.

These cars, mounted on 5½-in. by 10-in. trucks, have been made to carry 67 tons of coal, the light weight being 34,600 lb. and the load limit 134,400 lb. The reduction in weight, compared with the last previous Chesapeake & Ohio hopper car, is approximately 4 tons and, compared with the estimated weight of the proposed A.A.R. standard hopper car, approximately 3½ tons. The ratio of revenue load to gross weight is 79.5 per cent.

The weight of a large proportion of the coal carried by the Chesapeake & Ohio is approximately 54 lb. per cu.ft. Inasmuch as the A.A.R. standard cars have been designed on the basis of coal weighing 52 lb. per



End View of C. & O. Hopper Car

cu.ft., it was found possible to provide the necessary cubic capacity within the width and height clearances adopted for the A.A.R. standard car with a length of only 33 ft. 6 in. inside the body. The use of three hoppers was found desirable to obtain maximum cubic capacity with minimum length.

The Body

In the body of the car USS Cor-Ten steel has been used in general for all parts which come in contact with the lading. USS Man-Ten steel has been used for practically all body shapes with which the load does not make contact and low-carbon structural steel employed in those members where it was not considered necessary to provide either high strength or increased resistance to corrosion.

The three-hopper car body which, at the sides, is 10 ft. 8 in. above the rail, has a top bulb angle of Man-Ten of 5-in. by 2½-in. 8.5 lb. section. The ends, of the Dreadnought type, curve upward toward the center where the height is 11 ft. 9¼ in. The end is reinforced with a 5-in. by 3-in. by ¼-in. angle of Man-Ten. For the side stakes 5-in. by 2½-in. 7.3 bulb angles of Cor-Ten are used, as this section necessitates only one row of rivets at each post. The side sills and end sills are 5-in. by 3½-in. by ¼-in. angles of Man-Ten. In the center sill the railroad desired to maintain the cross-sectional area of the A.A.R. standard construction and therefore adopted the Z26 section of structural grade carbon steel for this member.

Principal Dimensions of Chesapeake & Ohio Light Weight Hopper Car

Length over striking plates	34 ft. 5¾ in.
Length inside	33 ft. 6 in.
Width inside	10 ft. 4 in.
Width overall	10 ft. 5 in.
Height, rail to top of sides	10 ft. 8 in.
Distance between truck centers	24 ft. 6 in.
Truck journals	5½ in. by 10 in.
Truck wheel base	5 ft. 6 in.
Light weight	34,600 lb.
Car body	21,260 lb.
Trucks	13,340 lb.
Load limit	134,400 lb.
Capacity, level full	2,258 cu. ft.
Capacity, 10-in. heap	2,525 cu. ft.
Ratio revenue load capacity to gross weight	79.5 per cent

The body bolsters are built up of Man-Ten with 3/16-in. web plates, 5/16-in. bottom cover plates, 5-in. by 3½-in. by ¼-in. bottom angles and 3½-in. by 3-in. by ¼-in. vertical stiffening angles. Substantial stiffening for the body is provided at the cross-ridges by 3/16-in. cross-ridge plates and cross-ridge and side-stiffeners formed from Cor-Ten sheets, punched out for lightness, which are bent at their upper edges to form an oval cross-section, with the edge riveted to the plate where it overlaps. The body side sheets are ⅛-in. thick and slope sheets, hopper sheets and cross-ridge sheets 3/16-in.—all of Cor-Ten. The main side sheets extend in one piece from the bolster to the center of the car where they are lapped and riveted to the side stake. In order to maintain the proper slopes on all three hoppers without lengthening the body, special construction has been used at one of the cross-ridges. The cross-ridge sheet is extended vertically above the center hopper slope sheet, thus permitting the adjoining hopper sheet to be placed at the proper angle for self-clearing.

The end slope sheet is stiffened between the body bolster and the end of the car by a 3-in. by 2½-in. by ¼-in. angle supported by 3-in. by 3-in. by ¼-in. angles. The hopper doors are of pressed construction made by the Union Metal Products Company and are formed so as to overlap the hopper sheets and are also dished to provide an increase in the cubic capacity. The doors are secured by Wine hopper door locks.

In general, the body is of riveted construction. However, a small amount of fusion welding has been used for joining members around the cross-ridges. Continuous welding is used for joining the top flanges of the Z center sills. The body rivets which come in contact with the load are Cor-Ten and all others low-carbon steel. The bolster center filler is similar to that designed for the new A.A.R. hopper cars. The total weight of the body is 21,260 lb.

Brake Equipment and Trucks

To provide adequate braking for the loaded car on heavy grades and to reduce the variation in the rate of retardation on the car when loaded and empty, these cars have been equipped with automatic empty and load brakes, having two brake cylinders. The braking ratio is 60 per cent on the light car and 30 per cent when the car is fully loaded. Five cars have brakes constructed by the Westinghouse Air Brake Company and five by the New York Air Brake Company in which the operation of the second cylinder is controlled automatically in accordance with the deflection of the truck springs. The hand-brakes are the Ajax geared type.

The light weight trucks have side frames of the integral journal box type with a wheel base of 5 ft. 6 in. The truck bolsters have integral center plates and are designed for the new A.A.R. center plate height of 25¾ in. The weight of both the side frames and bolsters has been reduced by the use of high-tensile cast steel. The wheels are the one-wear type of rolled steel, mounted on standard axles. The brake beams are A.A.R. No. 3 capacity, of high-tensile steel with heat-treated cast steel brake-heads. Creco four-point brake beam supports are applied to all cars. One Cardwell snubber is applied with each group of A.A.R. Type D truck springs.

The cars are equipped with the new design spring-plankless truck. The spring plank was retained at one end for the purpose of operating the automatic change-over device.

The railroad has applied to these cars two sets of each of the following draft gears: Waugh—No. 403, Miner—No. A-22-XB, Cardwell Westinghouse—No. NY-11-E, Edgewater—No. B-32-KA and National—No. M-17-A.

Prior to the introduction of high-tensile steels it has not been possible for the railroads to effect substantial reductions in weight and still retain the strength required for heavy freight service. The Chesapeake & Ohio has been alert to the possibilities of reducing operating costs by lighter equipment and has built these cars with a view to determining from experience obtained in regular service the over-all economies that may be obtained by the introduction of light-weight equipment designed for heavy-duty service.

The London, Midland & Scottish of Great Britain has recently installed equipment for the exhibition of sound motion pictures in cars to be operated on certain of its express trains between London and Leeds. After considerable experimentation, the announcement states, an apparatus has been perfected which will enable the "talking pictures" to be exhibited with "just the same precision" as in a motion picture theatre. The "theatre on wheels" will be equipped with a sloping floor and regular theatre seats; a small charge will be made for admission to each performance which will be of approximately an hour's duration.

Superintendents Discuss Operating Problems

Outstanding committee reports and informative addresses feature convention held in Chicago

Part I

AN unusually comprehensive consideration of modern operating problems, featuring the operating aspects of the new fast passenger and freight trains and the speeding up of yard operation, characterized the committee reports presented at the forty-first annual convention of the American Association of Railroad Superintendents in Chicago on June 18-20. Means of providing better merchandise service, elimination of grade crossing accidents and supervision over longer divisions were also featured in the committee reports.

The addresses delivered to the 144 members in attendance were also of high caliber, and included speeches by Ralph Budd, president of the Chicago, Burlington & Quincy; M. J. Gormley, executive assistant of the Association of American Railroads; Dr. C. S. Duncan, economist of the Association of American Railroads; William Atwill, vice-president and general manager of the Illinois Central; G. B. Vilas, vice-president and general manager of the Chicago & North Western; R. C. White, assistant general manager of the Missouri Pacific; Burt T. Anderson, special representative of the Union Switch & Signal Company and the General Railway Signal Company; and Joe Marshall, special representative of the Freight Claim division of the Association of American Railroads. The addresses of Messrs. Gormley, Atwill, Vilas and Marshall are abstracted below, while those of Messrs. Budd, White, Duncan and Anderson will appear separately in early issues.

The meeting was presided over by F. O. Coleman, superintendent of the Minneapolis & St. Louis, Oskaloosa, Iowa, president of the association. In his report, President Coleman stressed the fact that co-operation and full exchange of information are more necessary than ever before in the railway field today, in view of the constant change in the railroad picture, requiring changes in operating methods. "There can not now be any fixed, unchangeable standard of transportation," he said, "which makes it necessary that superintendents be vitally interested in new methods, policies and practices."

Officers Elected

At Thursday's session, officers were elected for the coming year as follows: President, H. C. Rochester, superintendent of passenger service, Canadian National System, Montreal, Que.; first vice-president, J. J. Brinkworth, assistant superintendent, New York Central, Buffalo, N. Y.; second vice-president, C. J. Brown, superintendent, Missouri Pacific, Osawatomie, Kan.; third vice-president, J. W. Graves, superintendent, Erie, Hornell, N. Y.; fourth vice-president, A. R. Pellner, general superintendent of terminals, Chicago & North Western, Chicago; secretary-treasurer, F. O. Whiteman (re-elected), St. Louis, Mo. G. T. Coleman, superintendent of transportation, Canadian Pacific, Montreal, and F. F. Laird, supervisor of yard and terminal operations, Chesapeake & Ohio, Richmond, Va., were elected directors to serve three years. Chicago was selected as the location for the next convention.

After the close of the session at noon, Thursday, the members inspected the new Hiawatha train of the Chicago, Milwaukee, St. Paul & Pacific; the Rebel of the Gulf, Mobile & Northern; the Abraham Lincoln of the Alton; the Zephyr of the Chicago, Burlington & Quincy; and the "400" of the Chicago & North Western, all of which trains were made available for inspection by their managements.

M. J. Gormley's Address

M. J. Gormley, vice-president of the Association of American Railroads, emphasized the fact that if divisional and general staff meetings are justifiable, staff meetings between railroads, such as this convention, are equally justifiable, particularly under present conditions. He recommended that the best operating practices be written up in book form to serve as a manual of operating practice, and stated that, with common enemies besetting them from all sides, secret operating practices should have no place on present-day railways.

Of the average per diem plan, Mr. Gormley said:

> The Car Service division has been attempting to have this plan adopted for years, without success, except as between a few railroads. The question of the car pool, however, brought average per diem very much to the fore, particularly since studies made by the railroads as to handling all classes of cars indicated that there was a possibility of saving in empty mileage through some such arrangement. Reports of the results obtained from the plan to date show that it has fully justified itself.
>
> Undoubtedly, difficulties will be encountered as its operation continues, but these will be easily adjusted. After the plan has been in operation a year no railroad will want to abandon it, in view of its effect in reducing empty car mileage. In times like these, little or no train mileage has been saved under the plan, but with heavier traffic this result will be attained. Meanwhile, the plan has resulted in taking off switch engines at certain points. The salvation of the railroads lies in reducing costs to a point where it will be impossible for any other form of transport to compete with them on traffic they should rightfully handle.
>
> Co-ordination of terminals should be studied to secure whatever savings may be possible, even though the labor provision of the Emergency Transportation Act has rather thoroughly blocked co-ordination between railroads. The latest figures available show that 24,000 miles of railroad are jointly operated, as well as 1,366 freighthouses and 1,902 passenger stations, while there are 1,013 joint inspection points. This progress toward co-ordination, made by the railways themselves, has been blocked by the very agency that sought further co-ordination.

William Atwill Speaks

William Atwill, vice-president and general manager of the Illinois Central, greeted the superintendents on behalf of Chicago railroads, speaking in part as follows:

> In this part of the country we have been hearing a great deal recently about a "grass roots" convention. Yours is a "grass roots" convention, for there is no other group of men on the railroads—certainly none having such great responsibilities—who are so close to the "grass roots" of railroad operation as are the division superintendents.
>
> The superintendent is a key man on the railroad organization.

He occupies a place of very considerable responsibility. He has complete control, within certain limits, of course, of his division. That part of the railroad is his railroad. His work touches all departments. He has direct managerial responsibility in connection with the roadway, mechanical and transportation departments, and he also has a great deal to do with the traffic, accounting and law departments.

The character of service that is provided for the public is one of his major responsibilities. His leadership is reflected in the attitude of employees on trains and in stations, and in the work that is performed on the track and in the shops. It is possible to travel over any division and observe the work that is performed by the employees and thereby obtain a pretty good picture of the man who is in charge of that division. In the larger sense each railroad is thus a reflection of its division superintendents as a whole.

The superintendent is enabled to become acquainted with every employee in his jurisdiction, something that is denied to officers of greater responsibility. He has an unusual opportunity to develop good feeling among the employees of all departments on his division. He represents to the employees the management of the railroad, and the railroad is judged by his actions. If he is considerate and fair, he earns the esteem and regard of the employees, and if he is industrious his example sets the pace for the work that is done on his division.

The same might be said of relations with the public. The superintendent necessarily comes into direct contact with shippers, public officers of counties and towns, representatives of chambers of commerce and other civic organizations, newspaper editors and business and professional men generally. To them also he is the representative of the railroad, and the railroad is judged by him. His attitude in public relations matters can be extremely harmful or beneficial to his company. The public relations of the railroad on his division, as evidenced in co-operation in the work of the railroad and in patronage of its services, is one of the yardsticks that measure his success.

G. B. Vilas Stresses Safety

G. B. Vilas, vice-president and general manager of the Chicago & North Western, gave a talk on competition and safety, which was particularly valuable by reason of the detailed statements describing how the C. & N. W. has maintained its remarkable safety record. Mr. Vilas also outlined the changes in railroad operation brought about by competition of various sorts. He said:

During the past four years of depression, railroad officers have had more chance to think than formerly, and some of the results are shown in the improved passenger service recently inaugurated by a number of western roads. Out of this competition I expect that the railroads will develop in due time the proper motive power and the proper weight and size of coaches, sleepers and other cars, to provide the safest service and the service and equipment that are most attractive to the people.

The midwest railroads' greatest competition comes from the Panama Canal, for boats are handling business that should be handled by the railroads from coast to coast and would be so handled if proper toll charges were made by the United States government on boats utilizing the Panama Canal route, or if the long and short haul clause were repealed. Much of the traffic that is now moving through the canal formerly moved by rail from coast to coast. At the present time, automobiles manufactured some distance from the Atlantic seaboard are being shipped to the West Coast via New York and the Panama Canal. Manufacturers of fire hydrants in Iowa and of machinery in Wisconsin have lost Pacific Coast accounts because they cannot compete with manufacturers who ship entirely by water from eastern plants to the Pacific Coast. This is working a hardship on the railroads, depriving them of tonnage to which they are justly entitled. The railroads are beset on all sides by subsidized unregulated competition; this competition should be brought under the same regulation as the railroads.

About two years ago Congress passed a bill popularly called the Co-ordinator's Act, which was intended originally to stimulate co-ordination. In practice, however, its effect has been precisely the opposite. This came about because of a requirement in the law that the railroads should not have in their employ a smaller number of men than they had in May, 1933, and that no employee should be in a worse position than he was in May, 1933, by reason of any action taken under the Co-ordinator's Act. The Co-ordinator took over all projects where it was proposed to unify facilities involving two or more railroads. That had the immediate effect of bringing into operation the provisions of the law.

Mr. Vilas also listed some of the things that have made the C. & N. W. safety record possible, as follows:

Standing upon the footboards of engines in motion while coupling them to cars is prohibited.

Going between cars or between any car and engine while in motion is prohibited.

Standing upon a footboard between an engine and cars is prohibited.

Walking in front of a moving car or engine is prohibited.

Pushing over drawbars of moving cars or engines for any purpose whatever is prohibited.

Riding the leading deadwoods or drawbars of engines or cars or tank beams of engines in the direction of movement is prohibited.

Riding the leading footboard of an engine in the direction of movement is prohibited unless authorized by the proper officer.

Every employee should be on the alert to watch for defective equipment, hot boxes or something dragging, and signal the train crew, who should be on the alert. A highball should be given if o.k. and a stop signal if anything is wrong.

Train and enginemen must observe one another's trains on adjoining tracks and look out for hot boxes, loose doors or anything protruding or dragging, and trainmen on passing trains must signal one another.

We have installed a red headlight on locomotives pulling long freight trains between Chicago and Omaha, Neb., which shows in the day as well as at night. This headlight is used in every case where brakes are applied from any cause other than the normal operation of train control apparatus or by the engineman himself. When the engineman finds it necessary to stop his train due to some defect or under circumstances which might cause a derailment, and throw a car on the opposite main, he must immediately turn on the emergency red headlight by the same motion in which he turns off the white headlight. When this is done, enginemen on approaching trains on adjacent tracks will bring their trains to an immediate stop and proceed only after finding the track clear.

Freight Claims

Joe Marshall, special representative of the Association of American Railroads, discussing freight claims, said:

The depression has distorted our loss and damage figures, bringing them to the lowest point in over 30 years. For 11 years loss and damage were reduced while business was climbing to its highest peak in history. The total bill was brought down from $119,000,000 to $35,000,000 in 1928. Claims are reduced when business is reduced, so loss and damage dropped another $10,000,000 after 1928 and still another $10,000,000 between 1931 and 1933. Our problem now is to prevent this last $10,000,000 from coming back into railroad expenses.

The loss and damage bill aggregated $15,485,440 in 1933 and $17,034,031 in 1934, an increase of $1,548,591, or 10 per cent, compared with an increase in total carloadings of 5.4 per cent and an increase of 5.6 per cent in gross freight revenue. It should be remembered, however, that loss and damage always trails the business it represents.

In 1919, loss and damage represented 2.39 per cent of total operating expense. This percentage decreased year by year, but it has never been as low as shown in the Interstate Commerce Commission's report for 1932, when it was 0.72 per cent. The percentage during intervening years has ranged from 0.78 to 0.74. For the 12 months ending December, 1934, loss and damage increased 10 per cent. For the 12 months ending with March, 1935, the increase was 17.8 per cent. Losses in all manufactured products moved up sharply, payments for coal, furniture, automobiles, iron and steel, dry goods and clothing, making the sharpest upward move.

The rough handling column is being eliminated from the standard form to meet changed conditions and to direct attention to the many other causes for damage, and also because this information is misleading to outsiders, who draw wrong conclusions as to the purpose of this column. High speed and floor vibration account for most of the general damage today and not rough handling.

The general committee of the Transportation division has abolished the Committee on Freight Handling Service and this committee has been consolidated with the Freight Claim division's Committee on Freight Claim Prevention, now to be known as the Committee on Loss and Damage Prevention. Since loss and damage prevention means better service and is fostered by ideas, the national committee requests that the local committees supply material which can be used for the purpose of generating other ideas.

There is no better yardstick by which to measure railroad efficiency than the national loss and damage bill. Since loss and damage result from service failures and railroad service is accomplished through the co-ordinated activity of great numbers of employees, it follows that collective discussion of failures has proved to be the best method for overcoming them. At the present moment the important thing is to insure that a beginning is made in increasing local and territorial committee activity. Experience has not yet developed a substitute for committee activity

as a means for co-ordinating the efforts of railroad men to improve freight handling.

The size of the committee is immaterial, providing its members are in a position to gather and correlate the collective prevention experience of the railroad men with whom they are in contact during their routine of duty. The whole job of preventing damage consists of unrelenting supervision and checking against failure of men and machines and methods. The men must help in this check against failures and the only practical way of bringing this about is to have representatives of every department meet together from time to time.

Shippers, in their search for savings, have reduced bracing and packing, forcing the railroads to meet that issue while at the same time increasing loading and speed, a combination which will require a new start. Future trends will favor less expensive containers and their elimination wherever possible. Many commodities will move both with and without containers and many loads without bracing. Loading and loading methods will constitute the most important problem of the future from a damage standpoint, and every load presents a different problem. One cannot lay down certain fundamental rules for general application to the tens of millions of cars loaded in this country each year. The only practical way to solve this problem is by a general exchange of information bearing upon the methods found to be successful in one degree or another.

Part II, containing committee reports and their discussion, will follow in next week's issue.

Revised Waterway Bill Reported to Senate

WASHINGTON, D. C.

EMPHASIZING the chaotic situation now existing by reason of regulation of one part of the national transportation system while other parts are not regulated, the Senate committee on interstate commerce on June 21 favorably reported to the Senate S. 1632, the water carrier regulation bill proposed originally by Co-ordinator Eastman, with various revisions made by him following a recent meeting with the committee to omit numerous controversial features. The bill had been temporarily laid aside by the committee but was taken up again after the President in his transportation message to Congress had indicated that he hoped to have it passed at this session. After referring to the bill as a companion bill to S. 1629, providing for regulation of motor carriers, which passed the Senate on April 16, the committee report continues in part:

One purpose of the bill is to bring together in one agency, the Interstate Commerce Commission, the present regulation of water carriers which is now divided between that agency and the Shipping Board Bureau of the Department of Commerce. The Commission now regulates all joint rail-water rates of interstate water carriers and also the port-to-port rates of such water carriers as are owned by railroads. The Shipping Board Bureau regulates to a considerable extent common carriers by water in foreign commerce except ocean tramp ships and contract water carriers on the Great Lakes. It has rather complete regulatory authority over common and contract carriers in the intercoastal trade through the Panama Canal.

A second purpose of the bill is to provide regulation for common carriers by water in coastwise or inland water commerce neither owned by nor publishing joint rates with railroads. These carriers are not presently regulated by any Federal agency.

A third purpose of the bill is to provide for interstate contract water carriers the minimum regulation necessary to preserve the service of interstate common carriers by water.

The bill thus provides regulation by the Interstate Commerce Commission of all common carrier water transportation other than such as may be provided by ocean tramp steamers; it provides a minimum of regulation of interstate contract water transportation "actually and substantially competitive with transportation by interstate water carriers."

Subsequent to the hearing, the committee has studied the bill and the objections offered thereto and it is believed that practically all objections of substance have been met in the amended bill herewith reported.

As originally drafted, the bill proposed much more comprehensive regulation of interstate contract transportation and some regulation of private carriage. The committee has amended the bill so as to exclude from regulation all private carriage and the contract transportation "not actually and substantially competitive with transportation by common carriers by water in the same trade or route" (sec. 302 (b)). The bill is also amended to provide a minimum of regulation deemed necessary to prevent unfair competition by interstate contract water carriers in competition with interstate common carriers by water.

The bill as originally introduced also attempted to codify and in some degree to extend the present regulatory authority over common carriers in foreign commerce. These proposed changes in the present shipping laws contained in the original draft were written from recommendations contained in the annual and other reports of the Shipping Board to the Congress rather than as the result of special study by the Co-ordinator of the need for extending regulation over such commerce. The committee, in eliminating all of these foreign-commerce sections of the bill, has simply substituted therefor a transfer to the Interstate Commerce Commission of the present regulatory authority of the Shipping Board Bureau of the Department of Commerce over common carriers in foreign commerce under the Shipping Act of 1916 and the Merchant Marine Act of 1920. This transfer includes the personnel of the Division of Regulation of that Bureau.

The bill does not affect the authority of the Department of Commerce over navigation, over loans for vessels, etc., or the many other administrative duties touching shipping now vested in that Department or its various bureaus. This separation of functions and transfer of regulatory authority to the Commission is in line with the President's message of March 4, 1935, on ship subsidies It was the opinion of this committee that the Commission might in the future ask Congress to make such changes in the law as it from experience and study may deem necessary in order to provide codification or extension of regulatory control, and that in the meantime, only such regulatory authority as now exists should be transferred to the Commission insofar as common carriers engaged in foreign commerce are concerned.

Another feature of the bill as introduced was its inclusion of Wharfingers (operators of water-terminal facilities) as persons subject to regulation. The committee has eliminated all reference to wharfingers in the bill, pending completion of additional studies now being made by the Co-ordinator into the entire question of terminal charges and services.

Another major change made by the committee is the elimination of the commodities clause contained in the original draft of the bill. Section 314 of the bill was patterned after section 1, paragraph (8), of the Interstate Commerce Act. It forbade common and contract interstate water carriers to carry commodities owned by them except such as were intended for their use as carriers, with a proviso, however empowering the Commission to grant exemption therefrom upon a finding that such exemption would be in the public interest. The committee eliminated the section entirely with the idea that if, after experience with the administration of the law, the Commission should find it in the public interest to have a commodities clause enacted, it could make appropriate recommendation therefor.

The transportation system of the Nation is a unit. The various agencies of transport interlock and react, one against another, in a multitude of ways. Only part of that system is regulated and such regulation as exists is unco-ordinated.

The present situation is chaotic. It cannot continue in status quo. The railroads are seeking to be released from the comprehensive regulation to which the Congress has deemed it necessary to subject them and, unless their competitors are subjected to some regulation, the Congress may have to permit them a freer hand to meet that competition. Given a free hand to compete with water carriers, the rails could again sweep the rivers and coasts clean of water competition as they did in the past before the Mann-Elkins Act with its restriction on long-and-short-haul discriminations.

The committee feels that the very existence of the interstate common carriers by water depends on a more even degree of regulation. The transportation system cannot long continue half-regulated and half-free, and a return to the days of free-for-all combats between the various competitive agencies of transport would result fatally for such carriers.

The committee believe that co-ordinated regulation on the other hand will open new and greater opportunities for these water carriers and the shippers dependent upon them for service. The ultimate objective is a system of co-ordinated transportation for the Nation which will provide the most efficient means of transport and furnish service as cheaply as is consistent with fair treatment of labor and with earnings which will support adequate credit and the ability to utilize fully all the inherent advantages of each form of transportation. All parts of such a system of transportation should be in the hands of reliable and responsible operators whose charges for services would be known, dependable, and reasonable, and free from unjust discrimination.

The Pleasing Bridge Structure Provided at Chemung Place, Which Is Similar to the Structures Built at Miller, Henry and Hudson Streets

Erie Eliminates 15 Grade Crossings

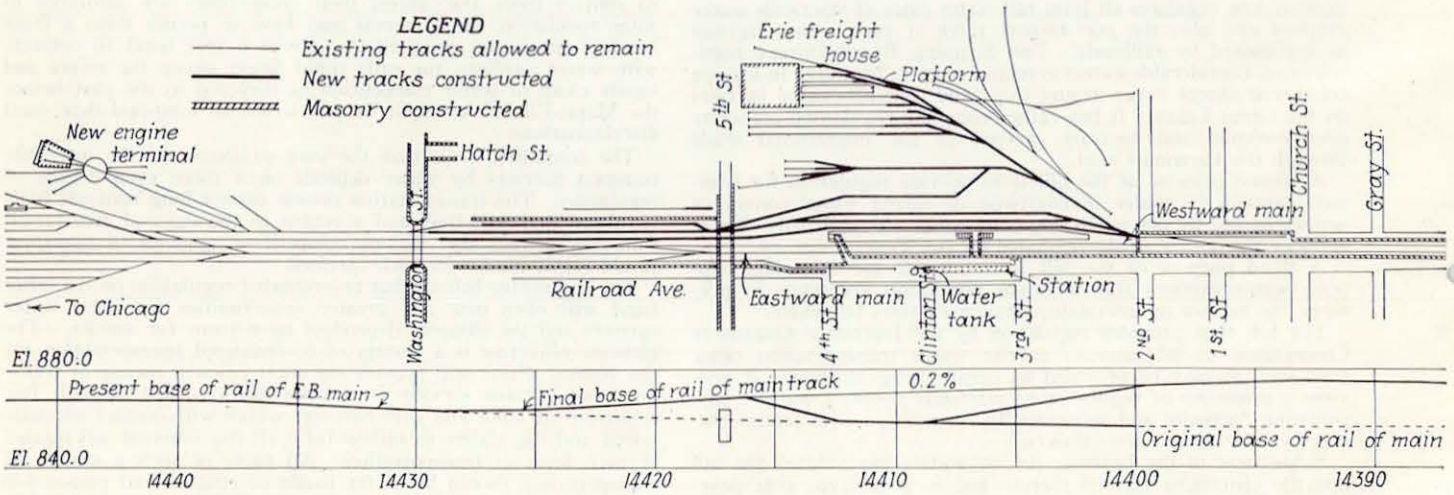
ONE of the largest and most important grade separation projects that has ever been undertaken by the Erie is nearing completion at Elmira, N. Y., where 15 street grade crossings have been eliminated through an important part of the city. In this project, which extends for 2½ miles, the two main tracks of the road, in addition to industry and yard tracks, have been elevated, partly on earth embankment and for 1,565 ft. on a reinforced concrete viaduct which extends over four streets; separate bridges have been constructed at 9 of the street crossings; a high-level two-track bridge, 777 ft. long, has been constructed over the Chemung river, almost in the center of the project, replacing a low-level bridge; the old engine terminal and numerous freight tracks directly opposite the passenger station have been rebuilt in the western part of the city; and new station platform facilities have been provided to accommodate the new high-level train operation. Started in the spring of 1932 and carried out in five construction steps, the work, including the river bridge and the engine terminal changes, is now nearing completion. Railroad traffic was taken off the streets at grade in October, 1934.

Old Situation Unsatisfactory

Prior to this work, a condition had long prevailed which had been unsatisfactory from the standpoint of the city, and also of the railroad, which has many train movements through the city and had to maintain protection at all of the 15 streets crossed. The Erie extends through Elmira in a generally north and south direction, but since the railroad as a whole is considered an east and west line, these latter directions are used in this description, east being compass south and west compass north. At the west limits of track raise, the railroad passed beneath Washington avenue, which at an earlier date had been carried over the tracks. The first street crossed at grade on the west side of the city was Fifth street, east of which the tracks entered the passenger station area, which extended for four city blocks, or approximately 1,700 ft., without street crossings. Immediately east of the station, while dividing Railroad avenue longitudinally into two roadways, the tracks crossed six streets at grade—Second, First, Church, Gray, Market and Water, all less than 350 ft. apart. Immediately east of Water street they crossed the Chemung river on a seven-span double-track bridge, made up of four three-truss spans and three through girder spans, the latter extending over an island in the center of the river.

East of the river, the railroad tracks crossed in succession at grade, Chemung place, Hudson, Henry and Partridge streets, Pennsylvania avenue, and LaFrance, Home and Miller streets. The alinement through the city was practically straight, with no grades of consequence except west of Washington street, outside the limits of the grade separation project.

Train movements through Elmira comprise from 60



Sketch Plan of the Grade Separation Work of the Erie

Elevates tracks through the city for a distance of 2½ miles in a project which involves a new bridge across the Chemung river, a 1565-ft. reinforced concrete viaduct and 9 street bridges

at Elmira, N. Y.

Above — The Reinforced Concrete, Clear-Span Bridge, With Box-Type Abutments, Provided at Second Street, at the Extreme West End of the Viaduct

Right—Looking West Over the New High-Level, Deck Girder River Bridge at Elmira and the Long Reinforced Concrete Viaduct Immediately Beyond

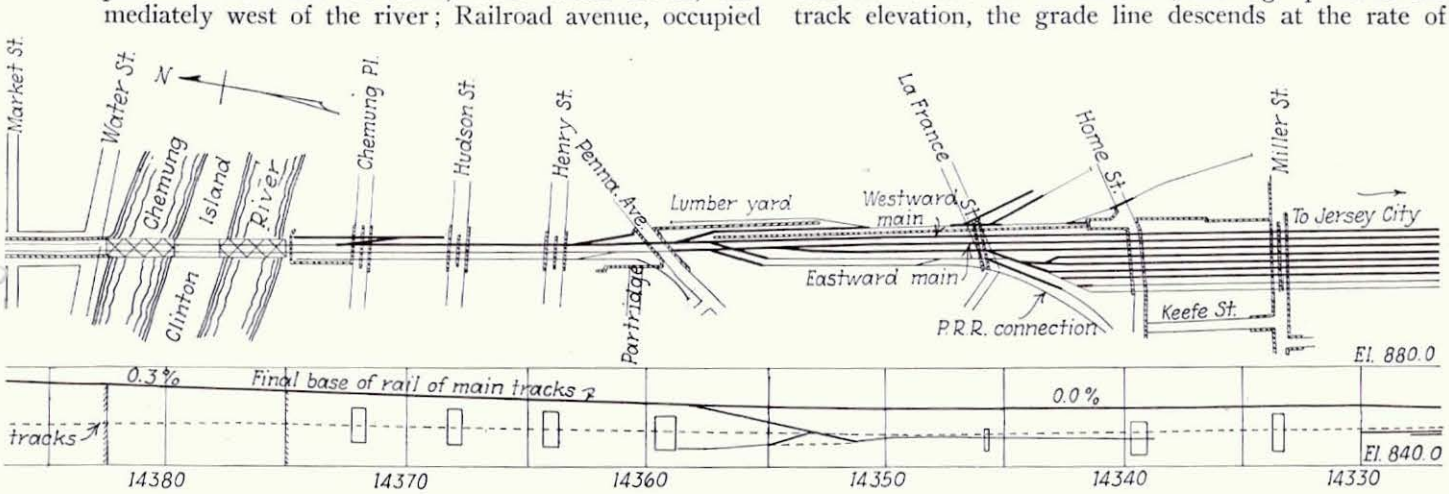
to 70 trains a day, mostly freight, including 10 to 18 trains of the Pennsylvania, which connects with the Erie near LaFrance street and uses its tracks westward through the city. There are also a substantial number of switching and transfer movements made by both railroads. All of this service has had to be maintained without interruption throughout the work.

The Pennsylvania, with its yard facilities south and east of the Erie's tracks, is now engaged in separating the grades at three streets on its line—South avenue, West Miller and South Main streets.

Conditions Required Track Elevation

Because of the general topography throughout the limits of the project, a high ground-water level, and the high-water level in the river which was only 2½ ft. below the base of rail on the bridge crossing, track elevation was decided upon as most practicable and economical. In fact, because of shallow city sewers in most of the streets crossed, underclearance for most of the streets was obtained by raising the tracks for practically the full required distance rather than by depressing the streets. However, certain of the streets toward the east end of the project were depressed considerably without much difficulty, which was of particular advantage because of a number of yard tracks in this vicinity which had to be brought up with any raise of the main line tracks.

The controlling streets in the project, from the standpoint of the track elevation, were Water street, immediately west of the river; Railroad avenue, occupied by the tracks west of the river; and Miller street, at the east end of the project. Because of possible high water conditions in the river, Water street and Railroad avenue could be depressed at most only three feet, and, because of existing sewers and high ground-water, Miller street could be depressed a maximum of only nine feet and provide natural drainage of the subway. With these governing elevations, the elevation of the tracks was begun near Washington street, approximately one-half mile west of the station, first ascending on a 0.2 per cent grade to Gray street, approximately 1,700 ft. east of the station. From here, the high point in the track elevation, the grade line descends at the rate of



at Elmira, N. Y., Where 15 Grade Crossings Were Eliminated

0.3 per cent for approximately 3,000 ft. to Pennsylvania avenue. Thence, following a level grade for approximately one-half mile to Miller street, the tracks again descend on a grade of 0.3 per cent eastward for approximately 3,450 ft. to the old track level.

In addition to the slight depression of Water street and that section of Railroad avenue near the river, and the nine-foot depression of Miller street, the new track profile required the depression of Pennsylvania avenue and also of both Home and Fifth streets. A pump is required to drain the subway at Fifth street, and pumps would likewise have had to be provided at both Home and Miller streets if a new gravity sewer had not been built to drain the newly depressed street areas.

From the west end of the track raise, the elevated tracks are carried on an earth embankment, retained largely on the south side along Railroad avenue and through the station area by concrete retaining walls. From Second street east to the bridge over Water street, the tracks are carried at the high level on a reinforced concrete viaduct, the open construction of which improves the view afforded traffic at the cross streets. Beyond the bridge at Water street and the two-track structure over the river, the tracks, from two to nine in number, are carried entirely on earth fill, except at the

Beneath the Viaduct at Church Street — Similar Construction Is Also Used at Gray Street

street crossings, with sections of solid retaining walls or concrete crib walls at only a few places where they were absolutely necessary or where additional right-of-way could not be secured at a reasonable price.

Several Types of Bridges Employed

All of the streets crossed were bridged except two; these being LaFrance street, which was provided with an eight-foot pedestrian subway beneath the tracks, and Partridge street, which was closed and its traffic diverted to the Pennsylvania avenue undercrossing over a newly constructed connecting street. Several types of street bridges were employed in the project, the specific type used at each street depending largely upon the width and importance of the street. Two of the street bridges have piers in the center of the roadway, while seven have clear spans between supports at the curb lines. Four other streets, Market, Gray, Church and First, cross beneath the viaduct.

At three streets, Fifth street, Water street and Pennsylvania avenue, where it was desired to have clear roadways, through plate girder structures were employed, with street spans of 35 ft., 47 ft. 2 in., and 61 ft. 2½ in., respectively. The other four structures where clear street spans are employed are either of reinforced concrete construction as a part of the viaduct structure, or have I-beam decks encased in concrete. In the case of the three through girder street bridges, the facia girders are encased in concrete so that they harmonize with the other bridges. In the Water Street bridge, a beam floor system encased in concrete was used, while in the other two girder bridges, I-beam and steel plate deck construction was employed.

Where street columns are employed in the viaduct area, the decks of the spans over the streets are integral parts of the reinforced concrete viaduct, while where center piers are employed outside of the viaduct area, the decks of the structures are of I-beams encased in concrete. All of the bridges are designed to carry Cooper's E-70 loading. Underclearance of 14 ft. is provided at four of the more important streets, while 13 ft. is provided at the other streets.

Six of the street bridges are supported on reinforced concrete box-type abutments, which, with open piers at the curb lines, provide decks over the sidewalks, while in the case of the Pennsylvania Avenue crossing, because of the severe skew of the bridge (approximately 37 deg.), steel sidewalk spans with steel curb columns encased in concrete, and gravity-type abutments have been used. A feature of all of the bridges is that they were designed to permit erection and use in sections to avoid obstructing the full width of the right-of-way and thus interfere with train operation, and, furthermore, to permit high-level operation of a part of the train movements at the earliest possible date.

All of the bridge decks are waterproofed with two-ply fabric in asphalt, protected on the horizontal areas with 1¼-in. asphalt plank, and on the vertical sides of the parapets with shale brick.

Details of Viaduct Construction

The long concrete viaduct west of the river carries two tracks for about two-thirds of its length, or east of Church street, while west of Church street it carries three tracks, including the two mains and a switching lead to the freight facilities north of the passenger station. This type of structure, rather than a fill and retaining walls, was decided upon because of the restricted width of only 20 ft. available between the separated roadways on Railroad avenue, which would not have provided for a fill of sufficient width to carry two and three tracks. As a matter of fact, in order to provide for two-track operation on the viaduct, it was necessary to cantilever the deck out over the two roadways for a distance of five feet on each side. Steel construction was considered, but the concrete structure was decided upon primarily because of its appearance and its greater sound-absorbing qualities, both of which were considered important in view of the business character of the adjacent property.

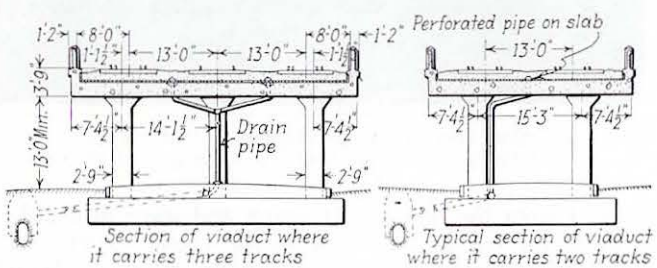
Throughout the two-track section of the viaduct, the

deck, 30 ft. wide, is supported on two-column concrete bents, while in the three-track section, where the deck is 43 ft. wide, it is supported on three-column concrete bents. The single exception to this arrangement is in the two-track section near Water street, where, in order to put half of the viaduct into service prior to the construction of the other half, special three-column bents were employed.

The columns, with flared heads supporting the deck slab, without drop panels, range from 28 in. to 34 in. in diameter. In the two-column bents they are spaced 15 ft. 3 in. center to center, while in the three-column bents they are spaced 14 ft. 1½ in. center to center. Lengthwise of the viaduct, the bents are located from 18 to 18½ ft. center to center, except at the street crossings, where they are either 26 ft. 9 in. or 28 ft. 9 in. center to center.

The deck, which is divided by expansion joints into 18 sections of lengths varying from 74 ft. to approximately 127 ft., is designed as a continuous beam between joints, with two-way reinforcing in the two-track slabs and four-way reinforcing in the three-track slabs. Because of the grades of 0.2 and 0.3 per cent on the viaduct, in opposite directions, and the further fact that the passenger station is only a few hundred feet west of its west end, the viaduct is subject to the forces resulting from both locomotive tractive effort and train braking. Both of these factors were taken into consideration in the design.

Assuming the most severe condition of two trains passing on the viaduct, one working steam up grade while the other is braking, additional load equal to 15 per cent of the two-track live load was added in effecting the deck design. Furthermore, temperature stresses

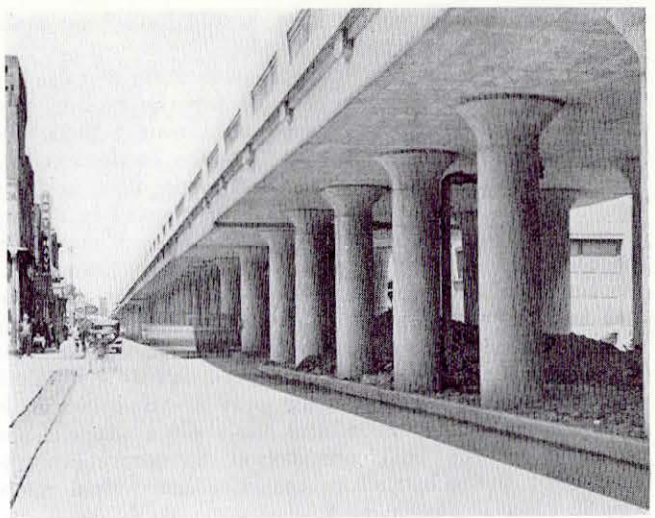

Perforated pipe on slab
Drain pipe
Section of viaduct where it carries three tracks
Typical section of viaduct where it carries two tracks

Typical Cross-Sections of the Two- and Three-Track Sections of the 1565-Ft. Viaduct Constructed in Railroad Avenue

and the thrust resulting both from tractive effort and eccentric loading were taken into consideration in the design of the bents.

As with the concrete decks on the street bridges, the viaduct deck is waterproofed with two-ply fabric in asphalt, protected by 1¼-in. ashpalt plank on horizontal areas and shale brick on vertical areas. A six-inch, half-round perforated asphalt-coated iron drain laid in an iron channel lengthwise of the structure between tracks affords quick drainage to scuppers and downspouts. Both sides of the viaduct are provided with solid-panel concrete balustrades, which obscure the running gear of equipment from the street level. Another interesting feature of the viaduct is the fact that, except for short sections at the east and west ends, the entire structure above its foundations was completed in 58 working days.

The foundation of the viaduct is of precast concrete piles throughout, this type of construction having been decided upon after test borings disclosed irregular strata of sand, clay and gravel of doubtful bearing ability, and ground water from 10 to 12 ft. beneath the level of the column footings. The piles, 16 in. square in section, with beveled corners, were driven in clusters beneath the continuous pier footings of the column bents, from



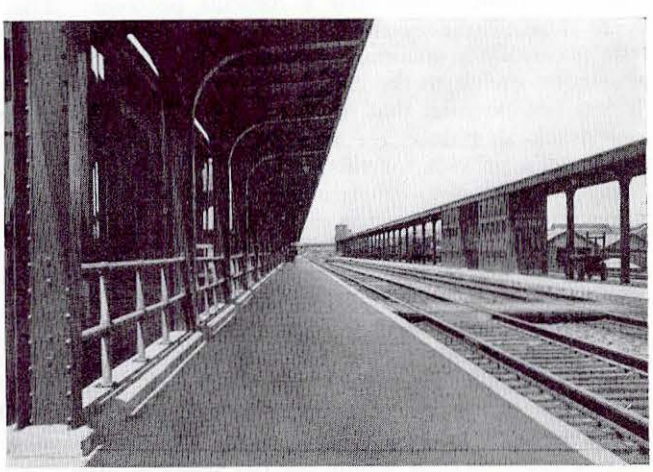
Looking West Along the South Side of the Long Reinforced Concrete Viaduct Longitudinally Above Railroad Avenue—Street Work Still Incomplete

23 to 45 piles to the pier, and were given penetration of from 12 to 23 ft. below cut-off.

The most interesting feature in connection with the foundation is the fact that the piles were poured during the severe winter of 1933-1934, and, as the result of using high-early-strength cement and steam curing, some of them were driven in the relatively hard ground when only three or four days old. Driving was done by an outfit equipped with a Vulcan single-acting hammer weighing 5,000 lb. and having a drop of 3 ft. Except for days of rain or unusually severe weather, an average of 30 piles was poured each day and a similar number was driven. Altogether, 2,300 piles, equivalent to approximately 40,000 lin. ft., were used in the foundation.

Long Girders Feature New River Bridge

Of as much interest as the viaduct construction, was the reconstruction of the existing Chemung River bridge in the same horizontal location. The old bridge consisted, in order, of two double-track, three-through-truss spans over the west channel of the river; three twin spans of through plate girder construction over the island in the center of the river; and two more double-track three-through-truss spans over the east channel. It might have been possible to have raised the superstructure of this bridge an average of 14 ft. to meet the new grade of tracks, but the expense of this with the addi-



Looking West Over the New High-Level Station Track and Platform Facilities at Elmira

tional cost of substructure work would have been more than that of the construction used.

An important feature in the consideration to raise the existing bridge was the necessity for the raising and putting in service of one track at a time. Since the three trusses of each of the truss spans of the existing bridge were all connected together by the floor and top lateral systems, it would have been necessary in raising them to cut one truss and a floor system of each span loose and raise them on falsework until the balance of the bridge was raised, and then to reconnect the floor and lateral systems. After having given consideration to this and all other factors involved, it was decided to replace the existing bridge superstructure with deck girder spans throughout, using only six main spans in place of the former seven, and one short approach span at the east end. This construction did not require the raising of the substructure masonry more than about 2½ ft.

The new bridge consists of four spans approximately 135 ft. long and two spans approximately 95 ft. long, the latter extending over the island. The 135-ft. girders, which are 11 ft. 6 in. in depth, weigh approximately 74 tons each, while the shorter girders each weigh approximately 35 tons. The track on the new structure is on a 0.3 per cent descending grade to the east and is from 13 to 15 ft. above the old track level.

The deck of the bridge is of the open type, with creosoted ties throughout, spaced 12 in. center to center. A feature of the deck is the fact that it was completely preframed and each piece given a location number before treatment.

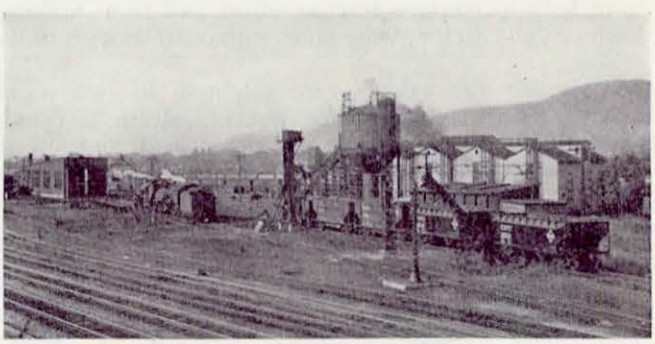
The high-level bridge, with its new arrangement of spans, required the encasement, underpinning and reconstruction of the top of one of the old masonry piers, the complete rebuilding of another pier and the old east abutment, and the construction of a new abutment to accommodate the east approach span and of one new pier to replace two old piers abandoned on account of the change in the number of spans. The west abutment and two of the old piers required little attention other than raising the bridge seats. A feature of the bridge plan adopted, and the key to the method of renewal employed, was the fact that the new bridge seats of the heightened masonry were kept below the base of rail of the tracks on the old bridge. This permitted the use of the old bridge during the masonry work and also the use of the old bridge tracks in placing the new steel.

Details of Erection Interesting

The erection of the high-level bridge on the site of the low-level bridge presented a difficult problem. There were close clearances at each end of the old bridge and it was necessary to maintain double-track operation. Furthermore, owing to the character of the Chemung river, it was felt essential that, to insure continuous operation, one track should be on permanent construction at all times. To provide for this, one of the first steps in the bridge work was to construct a temporary timber trestle along the north side of the existing bridge to carry westbound traffic while the new river bridge was being erected and the old one dismantled, and while enough of the concrete viaduct and other street bridges were being constructed to carry one track at final grade. With westbound traffic transferred to the trestle, the westward side of the old bridge was taken out of service. Then, with the new abutment and pier masonry brought up beneath the level of the existing tracks, the new westward spans were erected directly within the old spans at final grade, but 21 in. north of final alinement to provide clearance for trains on the new spans from the old center truss which projected above the deck of the new structure.

Briefly, the erection work was handled as follows: The 135-ft. girders, each resting on two cars with a third idler car between them, were moved out on to the old bridge, one at a time. Here they were set off on temporary blocking inside the old trusses by means of one 60-ton capacity crane operating at one end on the same track as the cars with the girders. When opposite girders had been so located, they were lowered by the 60-ton crane operating at one end as before, and then were drawn together into proper relation with each other and 21 in. north of final location, following which the cross frames and bracing were installed and riveted.

The 95-ft. girders in the two center spans of the new bridge were placed by the same 60-ton crane, but while it was located on the old low-level eastward track. These girders, which were loaded on two drop-end gondola cars with their ends projecting over two flat cars as idlers, were pushed out on the old westward track directly opposite their locations in the new spans. Then the crane, with a center hold, picked the girders up and set them alongside the cars for final location later. Following completion of the westward side of the bridge, the old north side trusses and floor system were suspended from the new girder spans and were dismantled without the use of falsework in the river. Then, with one track elevated on each side of the river, eastbound trains were routed over the new westward high-level spans and the eastward side of the old bridge was taken out of service and the new superstructure erected.



The New Engine Terminal in the Western Part of the City, Which Has Replaced Facilities Near the Passenger Station

Owing to the fact that the track approaches to both ends of the eastward side of the old bridge were cut off by the shift of eastbound traffic to the high level on the westward side of the new structure, it was not possible to move the new girders for the eastward side of the bridge out on the old bridge in the same manner as was done in erecting the westward side. In this work, the girders on cars were placed one at a time on the new high-level track directly opposite their final place in the bridge. With a crane at each end of the girder, on the same track occupied by the girder on cars, it was lifted high enough to clear the old center truss, was swung over beyond the truss, and was then lowered into its final location. The time required for this operation was about one hour.

When each pair of girders had been placed as described, the individual girders were connected with frames and bracing. To permit of this operation, the top bracing and struts between the old trusses had been removed, the center trusses stayed to the new steelwork in the westward track, and the outside trusses stayed with temporary timber braces on floor beams located to clear the new girders when landed. With the completion of the girder spans for the south side of the

bridge, the old spans were suspended from the new spans and were dismantled without the use of falsework.

Following the completion of the eastward side of the bridge, eastbound traffic was transferred from the westward track to its final location, which left the new westward side out of service. Before westbound traffic was transferred from the temporary trestle to the high level, the girder spans for the westward track were shifted to their final location, 21 in. closer to the new eastward side. This was done to bring about 13-ft. track centers on the bridge as is provided generally throughout the track elevation project.

New Station Facilities

An important phase of the Elmira work has been the adaptation of the existing passenger station facilities to the elevated tracks. The station itself, a two-story brick structure approximately 300 ft. long, was not altered other than to be provided with an interior stairway giving access to the high-level eastward track immediately adjacent, and to be repainted and redecorated on the interior. The major changes at the station were made in connection with the track and platform layout.

Through the station area there are five elevated tracks on practically the same alinement as the former tracks, but from 10 to 13 ft. above the old track level. On the south side, the fill carrying the tracks is retained, directly opposite and each way from the station, by a gravity-type retaining wall. On the north side, as is quite generally the case in the less congested territory east of the river, the fill has been allowed to take its normal slope unretained.

Three of the elevated tracks at the station, including the two main tracks, serve the station, while the other two tracks, along the north side of the fill, are essentially yard tracks. A 12-ft. concrete platform, approximately 1,100 ft. long and 9 in. above the base of rail, directly alongside the station serves the eastward main, while a similar concrete island platform at the same elevation, 16 ft. wide and about 1,100 ft. long, serves the westward main and the auxiliary station track. Both platforms are protected by steel-frame, wood-deck butterfly-type sheds.

The eastward platform, as before mentioned, is reached by a stairway directly within the station, while the westward platform is reached by means of a passenger subway beneath the tracks directly from the waiting room, with stairs leading both ways to the track level. Baggage, mail and express are handled to and from the new platforms by means of two 2½-ton electric elevators, one elevator being located at the extreme east end of the eastward platform and the other at the extreme west end of the westward platform. This arrangement avoids any serious interference between passengers and trucking operations, and also the necessity for crossing of the tracks.

The new eastward platform is directly over the old eastward platform, and is supported on steel framework and the new retaining wall along the eastward main track. The columns supporting the rear of the platform extend from the old platform level and are carried above the new platform level to provide support for the canopy. The old ground-level platform is used for trucking baggage and express between the baggage and express rooms and the elevators. To reach the westward elevator, a subway 10 ft. wide is provided beneath the two main tracks.

Water Supply Facilities

In connection with the improvements at the passenger station, a 50,000-gal. steel water tank on a steel substructure, and two water cranes serving east and westbound trains were altered to meet the new conditions, the water tank being raised 15 ft. Since it was desired to maintain operation of the water cranes during the construction period so far as it was practicable to do so, temporary water lines were laid to advantageous crane locations in connection with the temporary station platform facilities provided for use during the course of the work. A feature of these temporary water lines was the use of a composition flexible joint pipe, which could readily be salvaged and reused in the permanent lines laid later at the high level. The flexible joint feature of the pipe used made the pipe particularly advantageous for the permanent lines constructed in the new track fill, since it is felt that this feature will have a tendency to reduce trouble at joints through any unequal subsidence of the fill.

Work Was Carefully Scheduled

The work at Elmira, begun in April, 1932, has been carried out in five carefully-planned stages in which each phase has been co-ordinated with every other phase to the end that the project as a whole would progress smoothly, with the least inconvenience to pedestrian and vehicle traffic, and with a minimum of interference with train operation. In general, the south side of the right-of-way east of the river was raised first, including the construction of the south halves of the bridges, while throughout the length of the viaduct west of the river, the low-level tracks were spread temporarily to both sides of Railroad avenue and the viaduct was constructed as a unit in between. Through the station area, the tracks were swung to the north to temporary platform facilities while elevation of the permanent station tracks and platforms was under way.

Following the inauguration of high-level eastbound operation on June 25, 1934, the work on the north side of the right-of-way east of the river, the eastward half of the new river bridge, and the elevated station track and platform facilities, were brought to completion. Westbound high-level operation was put in effect on October 2, 1934.

This entire project was planned and has been carried out under the general direction of Geo. S. Fanning, chief engineer of the Erie, assisted in design by J. W. Smith, principal assistant engineer, F. A. Howard, engineer of structures, and A. M. Knowles, assistant engineer of structures. The construction work was directed by C. H. Splitstone, superintendent of construction, and C. M. Burgess, resident engineer. State of New York officials who collaborated in the design and construction were H. O. Schermerhorn, assistant chief engineer, department of public works, succeeded by E. W. Wendell.

The three main construction contractors on the project were The H. E. Culbertson Company, Cleveland, Ohio, which handled practically all of the preliminary work, including the construction of the new engine terminal and the substructure of the river bridge; the Metzger Construction Company, Buffalo, N. Y., which handled all of the grading and concrete bridge work east of the river; and the Folwell Engineering Company, Chicago, which handled all similar work west of the river, including the concrete viaduct and the station platform facilities. All of the track work was done by the railroad company's maintenance forces, under the general direction of J. C. Patterson, chief engineer of maintenance, and the major part of the structural steel work, including the reconstruction of the steel work of the river bridge, was done by the railroad company's bridge forces of the department of structures, under the direction of F. A. Howard.

Railroad Reorganization Bill Reported in House

WASHINGTON, D. C.

THE House judiciary committee on June 21 reported favorably the bill originally proposed by Co-ordinator Eastman to amend Section 77 of the federal bankruptcy law to facilitate railroad reorganizations, with various changes made as a result of hearings before the committee and conferences with Mr. Eastman and his counsel, Leslie Craven. As revised the bill was introduced the day before by Chairman Sumners of the committee as H.R. 8587. This bill is one of those included by the President in his program for this session of Congress. An explanation of the changes made in the bill as compared with the present law is included in the committee report in part as follows:

One of the main difficulties with reference to the present act is that a minority of more than one-third of any one class of creditors can obstruct and prevent the approval of any plan. This bill provides that two-thirds of those of each class who vote upon the plan will bind the dissenters and those of the class who fail to record their votes as provided by the act. It also provides that the court may make effective a fair and equitable plan over the dissent of such minorities. Under its provisions, the Commission will tentatively approve the reorganization plan; it will then be passed upon by the court after hearing the objections of all parties in interest. Before approving it, the court must find that the plan is fair and equitable, affords due recognition to the rights of each class of creditors and stockholders, does not discriminate unfairly in favor of any class of creditors or stockholders, and will conform to the requirements of the law of the land regarding the participation of the various classes of creditors and stockholders.

The plan, if approved by the court, will then be submitted to the creditors and shareholders. The consent of two-thirds of those of each class who vote upon the plan will bind the remainder in that class. But the judge may make the plan effective, even if not so accepted, if he finds that it conforms to the requirements just stated, provides fair and equitable treatment for the interests of those rejecting it, and that their rejection is not reasonably justified in the light of their respective rights and interests.

To lay a proper basis for the treatment of the interests of shareholders and creditors where it is questionable whether, in view of the value of the assets, they have an actual interest, a valuation is required under the Bankruptcy Act. Great amounts of property are held by the railroad companies and valuations are difficult and expensive when based on inventory and appraisal. It is therefore necessary to amend the act by allowing a short method by which the issue may be determined without the introduction of testimony as to the original cost of the property, or its hypothetical reproduction cost based on inventory and appraisal.

Your committee has considered the protection of stockholders and creditors against unnecessary sacrifice from reorganizations made in a period of depression when bad conditions are transient. In order to protect against hasty reorganizations, and in view of certain dicta in the decision of the Supreme Court in the Rock Island reorganization case indicating the necessity of prompt action under the present provisions of section 77, H. R. 8587 carries a new sub-paragraph (g), under which the judge is required to dismiss the proceedings if there is undue delay in a reasonably expeditious reorganization, the matter being left to his sound discretion, after considering the recommendation of the Commission.

In order to protect the rights of stockholders and creditors which might be injured by a reorganization on the basis of depressed conditions in the event of an early return to prosperous times, paragraph (b) clause (3) provides that the plan may require the issuance of securities in the form of options or warrants to receive, or to subscribe for, the securities of the reorganized company to security holders who otherwise are not provided for in the plan.

Committees organized to protect the stockholders and bondholders may, under proper conditions, be effective instrumentalities in perfecting reorganization plans through co-ordinating and representing the otherwise di-organized groups.

Your committee regards it as necessary to protect the public, the security holders, and the debtor corporation against the extravagant fees allowed to committees and individuals acting as reorganization managers, and payable either by the security holders themselves or out of the debtor's estate. Section (p), which provides for the regulation of protective committees by the Interstate Commerce Commission (H. R. 8587), consequently, carries a provision whereby the Commission is required to approve the provisions of the agreements which govern the compensation and expenses to be received by such committees. Under the present provisions of section 77, both compensation and expenses may be allowed to officers and parties in interest. H. R. 8587 provides that such parties may be paid only their expenses, compensation being eliminated, the allowances to be made by the court within the maximum prescribed by the Commission.

Section 77 provides that the court shall appoint trustees selected from a panel chosen by the Commission. This provision has proved to be of doubtful practicability. A commission located in Washington cannot be well acquainted with the persons suitable as trustees for railroads scattered all over the country. Nor is a general panel a satisfactory arrangement, for it must be selected without regard for the suitability of particular men for certain trusteeships. H. R. 8587 includes, consequently, a provision under which the judge having jurisdiction of the reorganization is permitted to select the trustees in the first instance, subject to ratification by the Commission. This places the primary responsibility with the judge where it belongs. The Commission's power of ratification will be a desirable check against unsuitable selections.

Criticism has been made of the courts for their refusal in cases pending under section 77 to appoint trustees. Where property is left under the control of the old management, the exposure and correction of its abuses or failures is difficult. H. R. 8587 consequently carries a mandatory requirement that the judge shall appoint trustees. Where a trustee is appointed who has been an officer, director, or employee of the debtor corporation or any subsidiary corporation, the judge shall appoint another trustee or trustees who shall not have had such affiliation. It is not thought to be essential that this requirement be made applicable to the smaller railroads.

Under the present provisions of section 77, there is doubt whether the trustee under the typical equipment-trust agreement is entitled to the possession of the property insured by the terms of the agreements, it having been urged in some of the pending cases that, under the provisions of section 77, the equipment-trust arrangement must be treated as an ordinary mortgage. If this were done, the investors in the trust would, consequently, be deprived of the preference intended to be preserved to them by the terms of the agreements, which in form and substance are generally in the nature of contracts of conditional sale. In view of the necessity of readily financing purchases of equipment at a time when the development of the transportation art is providing new forms of equipment, particularly in the passenger field, of which, in interests of efficiency and economy, the carriers should be able to avail themselves, and because after a depression the carriers are usually required to make large expenditures for equipment in order to accommodate the improved traffic, your committee is of the opinion that any doubt should be removed with reference to the validity of the equipment trust as a means of financing equipment purchases. Consequently H. R. 8587 carries an amendment in subsection (j) under which the title of any owner to equipment leased or conditionally sold to the debtor, and any right of such owner to take possession of such property, shall not be adversely affected by the provisions of the section.

Certain banking firms have enjoyed an advantage in reorganizations through information as to names and addresses of security holders which should be a matter of common knowledge. H. R. 8587, consequently, provides, subsection (c), clause (5), that it shall be the duty of anyone having such information to divulge it, the judge being empowered to require its production upon written request.

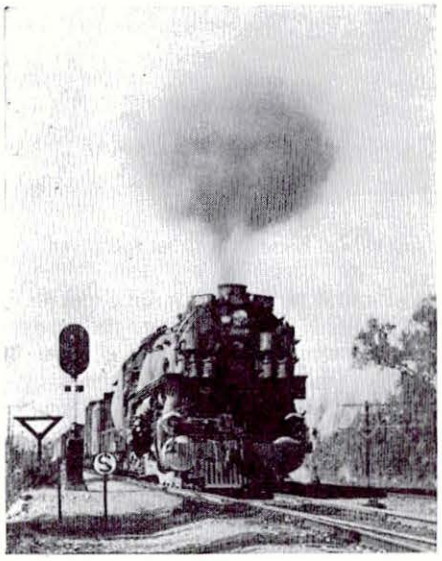
In order to insure the prompt disclosure and prosecution of any suits by the debtor arising from irregularities, fraud, misconduct or mismanagement under past administration, the judge is required by the provisions of subsection (c), clause (9), to direct the trustees to report any facts pertaining to the basis of such actions. This is regarded as necessary because of the difficulty in the past of bringing such situations to light.

A source of expense in pending reorganizations has been the determination of formula essential to the segregation and allocation of earnings and expenses between the parts of the railroad which are separately subject to different mortgages or leases. The bill carries a provision, subsection (c), paragraph (10), intended to facilitate the development of these formulas by the court upon advice of the Commission. Similarly, in the development of reorganization plans, a considerable volume of data is necessary with reference to the property, possible earnings, and corporate reorganization of the debtor. Under the present procedure, it is customary for many different committees to secure such data through experts employed by the respective committees, whereas such data might well be obtained by one agency, thereby

(Continued on page 1040)

Spring Switch on the Union Pacific Eliminates Delays

Installation at Marysville, Kan., including mechanical facing-point lock, facilitates train movements at bottle neck



The Speed of Facing-Point Train Movements Is Not Restricted

THE Union Pacific has installed a spring switch, with a mechanical facing-point lock, at the west end of a passing track at Carden, Kan., near Marysville. The St. Joseph & Grand Island line of the Union Pacific runs from St. Joseph, Mo., west through Upland, Carden and Marysville to Grand Island, Neb., and Gibbon, where it connects with the main line of the Union Pacific. Another branch extends from Marysville through Beatrice, Neb., to Lincoln and Omaha, while a third line connects the Kansas City-Denver main line at Topeka, Kan., with the St. Joseph-Grand Island line at Upland.

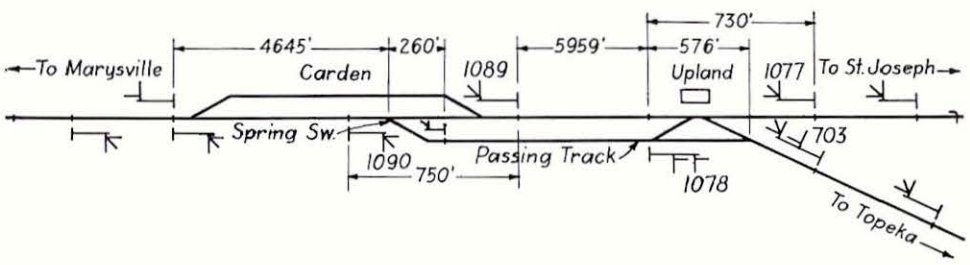
Over these lines the Union Pacific handles most of the freight moved between Kansas City and points west of Cheyenne, routed via Topeka, Upland, Marysville, Hastings and Gibbon. Likewise, traffic moving between Kansas City and Lincoln or Omaha is routed via Topeka, Upland, Marysville and Beatrice, while the Upland-Marysville section also handles the St. Joseph-Grand Island traffic. The 5½ miles of single track between Upland and Marysville is, therefore, a bottle-neck over which 2 passenger trains, 2 mixed trains and 14 through freight trains are operated daily. The passenger service is operated by gas-electric coaches while the through freight trains consist of about 100 cars each.

Train Movements Facilitated

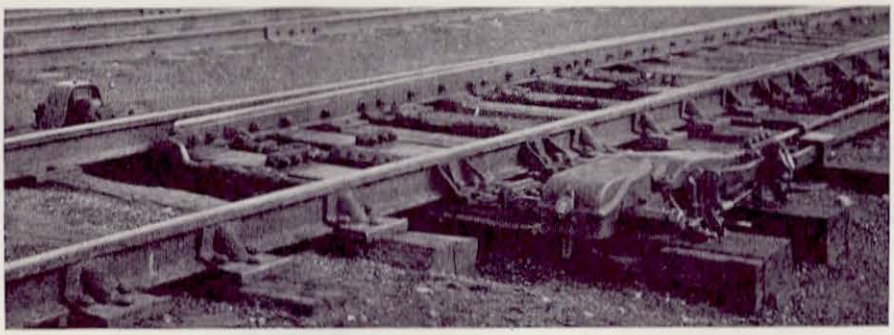
The track layout between Upland and Carden and thence to Marysville is shown in the accompanying illustration. An operator on duty at Upland during each trick handles the switches. The passing siding between Upland and Carden is 6,909 ft. long and is used several times each day, especially by westbound trains. On account of the number of train movements, it is important that delays be reduced to a minimum. Under the previous arrangement, with a hand-throw switch at the west end of the Upland-Carden passing track, a westbound train was usually required to stop after pulling out of the passing track to allow a trainman to return the switch to normal. Furthermore, because of curves, the view along the train was so obstructed that delays were introduced in passing signals to the engineman to proceed. As a rule delays of about 10 min. were encountered in these operations.

Such delays have been eliminated by the installation of the spring switch at the west end of the passing track. An additional advantage arises through the fact that, in numerous instances, westbound trains are run through the siding while meeting passenger or mixed trains or to let one of them pass, and in a large percentage of such instances the freight train can be kept moving and pulls out on the main track without having been stopped. The spring switch has thus proved to be a great help in eliminating numerous stops of heavy freight trains and has, therefore, reduced the delays to other trains. On occasions where it may be necessary for eastbound trains to use the passing track, the switch can be thrown by hand.

In this territory speeds of passenger trains are limited to 60 m.p.h. and of freight trains to 45 m.p.h., and in view of the fact that the switch points of the spring switch are locked by the facing-point lock arrangement, no reduction of speed is required for train movements in either direction on the main line. At other locations on this division where spring switches without locks are in service, speed is reduced to 20 m.p.h. for facing-point train movements. The elimination of the necessity for reducing speed by east-bound trains at the Carden switch



Track and Signal Plan of Layout Between Carden and Upland



The Facing-Point Lock Is a Part of the Switch Stand Apparatus

is of considerable benefit on account of the adverse grades.

When westbound trains are pulling out of the passing track through the No. 14 turnout, the speed is limited to about 6 m.p.h. while the locomotive is passing through the switch, this limit being fixed by the long wheel base of the locomotives with their five and six pairs of drivers. After the locomotive passes the switch, speed is increased to normal for the turnout.

Signal Protection

The main line from Topeka via Upland to Marysville is protected by color-light automatic block signals, and the same signals, with some rearrangements, are used to protect and direct train movements over the spring switch layout. Eastbound signal No. 1090 is located 85 ft. in advance of the facing point of the switch. This signal is controlled by the usual track circuit arrangement of the automatic block system, and in addition, checks the normal position of the spring switch and the normal position of the plunger in the facing-point-lock arrangement. Westward signal No. 1089, located 665 ft. from the switch in the trailing direction, likewise is controlled by the usual automatic block system and also checks the position of the switch and the lock.

A westward dwarf signal was installed at the clearance point at the west end of the siding to direct westbound train movements from the siding to the main line. The control of this dwarf extends through the automatic block system, the same as the control of signal 1089, but, in addition, includes the track circuits extending eastward from signal 1089 to Upland, so that if a train is approaching on the main line from either direction, the dwarf signal will indicate "stop." However, when the rear of an eastbound train passes signal 1089, the dwarf signal aspect changes to "proceed," permitting a train on the siding to proceed. The main line signals have three aspects, red, yellow and green, and the dwarf has two, yellow and red. The two main line signals are on approach-lighting control, but the dwarf is normally lighted.

Spring Switch Equipment

When installing the spring switch layout, new 7-in. by 9-in. creosoted fir ties were placed under the switch layout. The rail throughout the switch is 90 lb., the turnout being a No. 14 with 14 ft. reinforced switch points. Butt-type insulated gage plates, ¾ in. by 8 in., are used with adjustable rail-braces on the first, second and sixth ties under the point. In accordance with the standard arrangement at all main line passing track switches, a 1-in. by 8-in. lap-type insulated gage plate is located on the third tie ahead of the points to assist in holding the rail in line against the side thrust of a train when pulling out of the siding.

The Union double-acting oil buffer, mounted on ties at the north side of the track, is equipped with a valve to relieve the oil pressure when the switch is thrown by hand. The Union switch-operating and mechanical facing-point lock arrangement is mounted on the ties at the south side of the track. The plunger in the lock is operated by a pipe connection attached to the switch point. The spring switch location is marked by a sheet-metal circular disk 18 in. in diameter, with the letter "S" showing in both directions. This is mounted on a 2-in. pipe post at the south side of the track opposite the switch.

Much Opposition To Long-And-Short-Haul Repeal

WASHINGTON, D. C.

HEARINGS before a sub-committee of the House committee on interstate and foreign commerce on the Pettengill bill to repeal the long-and-short-haul clause in Section 4 of the interstate commerce act were concluded on June 26 after over a week had been devoted to vigorous testimony in opposition to the bill on behalf of representatives of shippers located at intermediate points and shipping interests operating through the Panama canal. The opposition was led by the Intermediate Rate Association, represented by Johnston B. Campbell, formerly a member of the Interstate Commerce Commission and before that a prominent spokesman for the opposition to the efforts of the railroads to retain water-competitive rates to and from Pacific coast ports without making corresponding reductions at intermediate points. Active opposition was also registered by the steamship interests represented by Frank Lyon, who contended that the purpose of the bill was to enable the railroads to put the water competitors out of business. Both classes of interests supported the bill introduced by Representative Driver, of Arkansas, H.R. 8364, to provide that no fourth-section relief shall be granted by the Interstate Commerce Commission "on account of water competition either potential or actually in existence," while some witnesses were willing to go as far as the bill proposed by Co-ordinator Eastman to amend the present law by eliminating the requirement that a lower rate for a longer haul shall be "compensatory."

The principal argument against the Pettengill bill was that it would give the railroads a free hand to make such low rates to competitive points, particularly those served by water, as to require them to place increased burdens on the intermediate non-competitive points, although the railroad witnesses had uniformly testified that they had no intention of raising intermediate rates and expected to earn additional revenue if allowed an opportunity to share in the competition at the ports.

The railroads had also contended that even without the restriction of Section 4 of the act the Interstate Commerce Commission would be able to prevent undue discrimination by the exercise of its powers under Sections 1, 2, and 3. Mr. Campbell and others, however, insisted that this would cast the burden of large expense upon the shippers in trying to enforce Section 3. "Under both Sections 2 and 3 the burden of proof is upon the shipper or community alleging violation of the act," said Mr. Campbell. "Not prejudice alone must be shown, but it must be shown that the discrimination is undue. The carriers inevitably fight the proceedings and in many instances their defense is insisted upon by the shipper or community being preferred." He also pointed out that the commission has not supported the bill.

Mr. Lyon also made the point that many of the representatives of large shippers that appeared in support of the bill are the same ones who have been instrumental in bringing about large government expenditures for waterways and said that they are now proposing to use the waterways merely to beat down railroad rates so that they will not have to use the waterways.

Members of the sub-committee who participated in the questioning seemed convinced by the arguments in support of the bill but their report will be considered by the committee as a whole. Some predictions have been made by those interested that the bill may be passed by the House but it has not been considered in the Senate.

C. E. Childe, chairman of the traffic committee of the Mississippi Valley Association, said that in the Mississippi Valley the greatest economic handicap is the "high transportation charges as compared with the lower level of transportation charges along the coastal rim of the country, which in turn is because the coastal area and I should also add the Great Lakes—have the benefit of cheap water transportation to a much greater extent than the interior. If we thought that the removal of the long-and-short-haul provision would help the interior to get lower transportation charges and promote our industrial development we would be here urging its repeal. But it is our view that the contrary would be the effect; that the repeal of the fourth section would increase transportation charges in the interior. We believe that that would result from the destruction of inland waterway transportation, which we think affords the main present hope of reducing transportation charges generally in the interior."

Others who testified in opposition to the Pettengill bill were: Ed P. Byars, for the Southwestern Industrial Traffic League; Charles A. Root, chief of transportation of the Idaho Public Utilities Commission; Harry Holden, member of the Idaho commission; Carl R. De Long, Twin Falls, Idaho; R. J. Baker, president of the American Steamship Owners' Association; J. B. Sweeny, vice-president and traffic manager of the Merchants' & Miners' Transportation Company; J. A. Coates, vice-president of the Eastern Steamship Lines, Inc.; Douglas W. Barton, vice-president of the Bull Steamship Line, Inc.; W. M. Levis, vice-president of the Clyde-Mallory Lines; C. H. Callaghan, manager of the Maritime Association of the Port of New York; Henry E. Ketner, representing the Virginia Corporation Commission; W. J. Peterson, representing Pacific coast steamship owners; Frederick Brenckmann, representing the National Grange; R. F. Burley, traffic manager of the McCormick Steamship Company; E. L. Hart, traffic manager, Atlanta, Freight Bureau; Walter H. Brusche, Merchants' Association of New York; George A. Duffy, Philadelphia Board of Trade; J. R. Van Arnum, Wholesale Fresh Fruit and Vegetable Distributors; John F. Shaughnessy, president of the Intermediate Rate Association; General T. Q. Ashburn, president of the Inland Waterways Corporation; and Andrew Furuseth, president of the Seamen's Union. General Ashburn opposed the Pettengill bill to repeal the long-and-short-haul clause entirely but advocated some modification of the "compensatory" clause of the fourth section.

Car Loading Increases

WASHINGTON, D. C.

REVENUE freight car loading in the week ended June 15 totaled 653,092 cars, an increase of 22,256 cars as compared with the previous week, of 34,211 cars as compared with the corresponding week of last year, and of 60,333 cars as compared with 1933. A large part of the increase was caused by heavy coal loading in anticipation of a strike of coal miners. All other commodity classifications except forest products showed decreases as compared with last year. The summary, as compiled by the Car Service Division of the Association of American Railroads, follows:

Revenue Freight Car Loading

For Week Ended Saturday, June 15

Districts	1935	1934	1933
Eastern	150,523	137,656	135,831
Allegheny	136,047	125,607	114,843
Pocahontas	52,774	42,203	40,809
Southern	91,025	83,530	87,051
Northwestern	88,126	90,932	75,983
Central Western	87,291	90,133	85,709
Southwestern	47,306	48,820	52,533
Total Western Districts	222,723	229,885	214,225
Total All Roads	653,092	618,881	592,759
Commodities			
Grain and Grain Products	25,843	33,806	38,251
Live Stock	10,346	12,812	15,468
Coal	157,245	97,347	94,892
Coke	6,472	6,827	4,940
Forest Products	26,455	25,118	25,762
Ore	32,632	33,924	12,937
Merchandise L.C.L.	156,970	161,453	168,832
Miscellaneous	237,129	247,594	231,677
June 15	653,092	618,881	592,759
June 8	630,836	616,768	569,157
June 1	565,342	579,656	512,974
May 25	599,543	625,990	545,551
May 18	583,327	612,331	535,719
Cumulative Total, 24 Weeks	13,990,174	14,167,298	12,092,943

The freight car surplus for the last half of May averaged 305,218 cars, a decrease of 31,262 cars as compared with the first half of the month. The total included 188,683 box cars, 68,216 coal cars, 28,493 stock cars, and 8,657 refrigerator cars.

Car Loading in Canada

Car loadings for the week ended June 15 totaled to 45,726 cars, as against 44,482 for the corresponding week last year and 43,832 for the previous week, according to the compilation of the Dominion Bureau of Statistics.

	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada:		
June 15, 1935	45,726	21,510
June 8, 1935	43,832	21,212
June 1, 1935	43,834	19,887
June 16, 1934	44,482	21,502
Cumulative Totals for Canada:		
June 15, 1935	1,024,969	538,244
June 16, 1934	1,003,733	560,445
June 17, 1933	825,564	419,367

C. B. & Q. Wins Harriman Gold Medal

THE Chicago, Burlington & Quincy is the winner of the E. H. Harriman gold medal for 1934, for its "outstanding safety accomplishment among Class I railroads, operating more than 10 million locomotive-miles per year." The Chicago, Rock Island & Gulf receives the Group B award, a silver medal, while the bronze medal, awarded to roads operating less than one million locomotive-miles, was won by the Nevada Northern.

The presentation of the medals was made at the Union League Club, New York, on June 26, at a luncheon given by Arthur Williams, president of the American Museum of Safety. The medals were presented by E. Roland Harriman, son of the late E. H. Harriman, and the citations were read by Lew R. Palmer of the Equitable Life Assurance Society, who is secretary of the Committee of Awards of the Harriman Memorial Medals.

President Ralph Budd of the Burlington, who was present at the luncheon, called upon G. P. Weik, veteran C. B. & Q. locomotive engineer, to represent that road in receiving the gold medal. In deferring to Mr. Weik, Mr. Budd pointed out that both he and Mr. Weik were not present as individuals, but rather as "types"—he representing the railroad management and Mr. Weik as typical of the careful employee—a man with a record of 52 years of service without accident. Mr. Budd stressed the importance of a contest in securing favorable results in the promotion of safety, and said that he would like to see some statistics showing the progress of railroad safety ascribeable to safety devices, as compared with that ascribeable to organized safety effort; he agreed heartily with whoever it was who said that "a careful man is the best safety device." E. Flynn, executive vice-president of the Burlington; W. F. Thiehoff, general manager, and H. C. Murphy, superintendent of safety, were presented by Mr. Budd to the guests.

The citation to the Burlington read in part as follows:

The announcement of this Group A winner affords considerable satisfaction, as it indicates the fact that the Chicago, Burlington & Quincy has forged ahead of some of the previous winners of this medal, giving definite evidence that the competition is becoming keener each year.

The Interstate Commerce Commission records show that this railroad has made a continuous improvement year by year in employee casualty rate, resulting in a reduction of approximately 90 per cent for the year 1934 as compared with the year 1923.

To President Budd, and to his entire safety-minded organization go our congratulations on this commendable achievement; a streamlined safety record as well as streamlined equipment; may they ever go hand in hand!

The Class B medal was accepted in behalf of the Chicago, Rock Island & Gulf by L. F. Shedd, superintendent of safety, Rock Island Lines. The citation read in part as follows:

You have brought the Chcago, Rock Island & Gulf Railway a long distance. Starting in the year 1923 as "cellar-champion" in a group of thirty-five roads, with an employee casualty rate of 64.65, you have, by consistent effort, improved your standing year by year, attaining a reduction of 95 per cent, and today have the honored distinction of receiving the most coveted railroad safety award—the E. H. Harriman Memorial Medal.

With less man-hours in 1923, the Gulf unit of the Rock Island had 143 employee injuries and 2 employee fatalities, while in 1934 this road had only 9 employee injuries and a clear fatality record. Checking back into the files of the Interstate Commerce Commission, and setting up the record for 1923 in accordance with the 1934 Harriman plan of award, we find a total-equated-points rating of 99.2 as compared with their winning rate of 3.28 for the year 1934 (another 95 per cent reduction). This junior unit of the Rock Island has gone a long way in railroad safety achievement, and the American Museum of Safety is proud to record the fact and to extend congratulations to the operating personnel of this unit and also to the officials of the Rock Island Lines.

E. V. Daveler, treasurer of the Nevada Northern, received the bronze medal in behalf of his company, the citation reading in part as follows:

Without a single reportable casualty, this road stands credited with a one-hundred-per-cent clear record for the year 1934; and, furthermore, the files of the Interstate Commerce Commission reveal the fact that the Nevada Northern has not had an employee fatality for ten consecutive years—a record in life conservation that this road may well be proud of.

We might here cite the fact that the Nevada Northern also received the 1934 award of the National Safety Council for roads of comparable size.

The guest of honor at the luncheon was Hon. Alfred E. Smith, former Governor of New York, who is one of the trustees of the American Museum of Safety. Mr.

Harry C. Murphy, Superintendent of Safety, C. B. & Q., and George P. Weik, Veteran Engineman

Williams presented him "as the most beloved man in our national life" and told how he had fathered the bill chartering the American Museum of Safety while a member of the New York State Legislature. Governor Smith told how he and Mr. Williams had made an effort to get the arsenal in Central Park, New York, as a safety museum and how they had failed. He also spoke briefly upon the contribution of workmen's compensation insurance toward the safety movement.

Mr. Williams spoke highly of the work of Dr. Frederick Hoffman, pioneer in safety work, and secretary Lew Palmer of the Museum. He also called attention to the fact that no award had ever been contested, due to the co-operation of the Interstate Commerce Commission, R. H. Aishton, retired president of the A. R. A. and Dr. Julius H. Parmelee, of the Bureau of Railway Economics in checking information upon which the awards are based. John E. Long, superintendent of safety of the Delaware & Hudson, and president of the National Safety Council, also spoke briefly, as did J. M. Davis, president of the Delaware, Lackawanna & Western, and James Speyer, New York banker, Mr. Davis paying high tribute to the safety record of the Interborough Rapid Transit Company of New York.

The members of the Committee of Award of the Harriman Medals are as follows: Arthur Williams (chairman), president, American Museum of Safety; Samuel O. Dunn, chairman of the board of the Simmons-Boardman Publishing Company and editor, *Railway*

Age; Hon. Frank McManamy, Interstate Commerce Commission; Charles M. Schwab, F. D. Underwood, Albert A. Hopkins, director, American Museum of Safety (ex-officio), and Lew R. Palmer (secretary), conservation engineer, the Equitable Life Assurance Society.

Labor Leaders Favor Government Operation

WASHINGTON, D. C.

APPARENTLY on the theory that the American public in the role of taxpayer would prove a more generous employer than it is in the capacity of shippers and passengers, and that Uncle Sam, operating with public money, would be less interested in earning interest charges than private investors, the Association of Railway Labor Executives at a meeting in Washington on June 20 adopted resolutions declaring itself "as favoring the immediate taking over of the railways of the United States by the federal government and the creation of agencies within the federal government to manage and operate the railways." It was announced that 19 of the 21 so-called "standard" railroad labor organizations had voted for the resolution. The Brotherhood of Locomotive Engineers and the Switchmen's Union of North America voted against the resolution.

The meeting of railroad labor executives was called to consider their legislative campaign and the resolution adopted seemingly represents their resentment because of the small progress made so far in their efforts to obtain passage of a pension bill providing for more liberal payments than those proposed for industrial workers generally by the President's social security bill and other bills on which leisurely hearings are being held before two or three members of the Senate committee on interstate commerce. These bills are designed to create a number of jobs as federal inspectors of track and bridges, to pay employees eight hours' pay for six hours' work, to increase the number of train crews by limiting the length of trains, and to require more men on the trains that are run. The labor executives have been successful in their efforts to continue the co-ordinator law for another year, with its restrictions against labor-saving economies, but have been conspicuously unsuccessful in their efforts to obtain compulsory legislation to require the retirement of the older employees. These bills have been opposed not only by the railroads but by representatives of shippers concerned with the large increase they would cause in the cost of railroad transportation, and the railroad labor leaders have decided that perhaps they would be better off under the management of a government that does not have to balance its budget. On the other hand they have given no indication that they would be satisfied with anything like a "security wage" of $50 a month for their unemployed members.

In a long series of "whereases" the labor leaders declared that the bankers are running the railroads, that they have increased their fixed charges and are still insisting on an interest return, although the latter represents no greater proportion of a return on the capital invested in the railroads than the proportion of the payroll now paid to the senior employees to the payroll as it used to be, and that as a result the railroads have been obliged to reduce operating expenses and are unable to finance themselves. No attention was paid to the fact that the federal government is operating at an even greater deficit than that of the railroads but there is a widely accepted theory that it can create all the money necessary to hire men for whom there is no work, to make capital expenditures regardless of whether they will pay for themselves, thus creating "purchasing power" in some places by reducing it in others, and to borrow money to pay interest that is not earned. Some of the declarations included in the "whereas" clauses are as follows:

Study of the many problems of the industry shows conclusively that the responsibility for most of its major difficulties is to be found in the fact that the railways have come under the practically complete domination of the banking and financial interests of the country.

Railway financiers had, during the decade preceding the depression, pursued in an especially reckless manner their general policy of taking for themselves as large a proportion of railway revenue as possible, while they loaded the industry down with a heavy and unjustified burden of debt. The growth of competing transportation agencies and the need for improved managerial methods to meet that competition were neglected by the railways under the urge of this purely financial control.

The effects of the depression which would have been serious even had the industry been properly financed, were, under the circumstances, disastrous. Railway revenues naturally declined, until the net income was in many cases barely sufficient to meet the swollen fixed charge brought about by pre-depression finance. The railway industry, which had been so rich a harvest for these financiers, and which merited their forbearance and protection, was now not only to be abandoned, so far as further financing was concerned, but was to feel a demand for a continuance of payments to its security owners, which has brought the industry to the verge of complete collapse. Necessary new financing has been denied. Refinancing of maturing obligations has been denied. Railway managements throughout the country have been forced to reduce expenditures for operating purposes not only to the minimum, but far below the lowest level consistent with proper operations. Railway facilities have been allowed to deteriorate to the point where the efficiency of railway service has been seriously impaired and where its safety has been greatly reduced. Railway workers absolutely necessary to a proper maintenance and operation of the railways have been thrown out of employment in order that the money which should have been paid in wages might be diverted to satisfy the demands of the railway financiers. The conditions thus brought about, already grave enough, will become even more dangerous unless they are immediately corrected. Railway roadbeds and equipment, already badly under-maintained, must show in future months in still greater degree, the results of these years of neglect.

It has become clear that neither railway revenues nor new private financing within any reasonable time in the future will permit the restoring of proper conditions upon the railroads. The United States government has, during the depression, taken over the duties and the responsibilities of these financial groups to the railway industry. Refinancing of maturing obligations and the financing of necessary maintenance and improvement of equipment has had to be undertaken by the federal government. It is evident that the industry will be dependent upon public financing for a long time to come; as a result of that financing, the holdings of private financial groups will increase in value.

A multiplicity of abuses which developed in the industry as a result of private ownership and operation had brought about in the half century preceding the depression, a complex and chaotic body of regulatory laws, both state and national.

The railway industry faces the necessity not alone of restoring its equipment and service to normal, but also of adapting itself to the new conditions brought about by the development of other transportation facilities. The chaotic operating and management conditions caused by the peculiarities of financial relationships must be corrected.

Governmental regulation by its very character is unfitted for such positive and constructive measures and there is every reason to believe that the financial interest controlling the railways will endeavor to thwart rather than to foster the public interest in the era of reorganization which confronts the industry.

Public ownership and operation of the railways under the federal government will permit the integration of the railways in the manner most conducive to safe, efficient, and economical operation. Federal financing under federal ownership will cost much less and can be much more wisely directed than either private or public financing under private ownership and operation. The necessary coordination of railways with other types of transportation can be done in a manner to safeguard public interests only if there is complete governmental control of the railways. The immediate rehabilitation of railway facilities, which is absolutely essential to the safe and efficient operation of the railways is not possible excepting through federal financing, and will be very difficult unless with federal financing, there is also federal ownership and operation.

Members of the Mechanical Division Meet at Chicago

E. B. Hall
Chairman

Fourteenth annual meeting held following lapse of two years in which division business has been conducted by general committee

AFTER a lapse of two years the Mechanical Division of the Operations and Maintenance Department, Association of American Railroads, held its fourteenth annual meeting at the Congress Hotel, Chicago, Wednesday and Thursday, June 26 and 27. The meeting was devoted strictly to the business of the Association with no formal addresses on the program. It was called to order by Chairman E. B. Hall, general superintendent of motive power and machinery, Chicago & North Western, who, in briefly reviewing the important activities of the General Committee and the standing committees, stressed the fact that the essential work of the division has been pushed forward aggressively since the last full membership meeting in 1932.

The General Committee presented a detailed review of the important actions which it has taken on recommendations from the various standing committees, all of which were formally approved by vote of the members present. It recommended a change in the rules of order of the Division providing for the taking of letter ballots to conform with Article 18 of the plan of organization of the Association of American Railroads. The present rules of order of the Division require two-thirds of the votes cast to adopt a proposition submitted to letter ballot whereas the A.A.R. rules require an affirmative vote of member roads controlling a majority of locomotives, passenger cars or freight cars as the case may be.

In announcing that the effective date of the prohibition in Rule 3 against the acceptance of any cars equipped with arch bars in interchange has been advanced to January 1, 1938, the General Committee pointed out that there remained in service on January 1, 1935, 782,464 freight cars or 32.5 per cent of all interchange cars equipped with arch bar trucks. It also reported that the joint committee, representing the Engineering, Mechanical and Purchases and Stores divisions to consider the establishment of central or regional inspection bureaus, has recommended that such bureaus be not established but that the railroads arrange to inspect for each other on the basis of direct cost plus 10 per cent. This recommendation has been approved by the General Committee and sent to the executives of the member roads.

The General Committee also announced that the equipment painting section of the Mechanical Division has been abandoned and that a small committee of the Mechanical Division will be appointed to deal with matters pertaining to equipment painting.

During the course of the meeting Dean A. A. Potter, of Purdue University, Roy V. Wright, managing editor of *Railway Age*, and L. W. Wallace, director of equipment research, A.A.R., were called upon for brief talks. Mr. Wallace complimented the Mechanical Division on its past accomplishments and expressed appreciation for the valuable help which the members, individually and collectively, have accorded him in his attempt to organize the work of equipment research. He stated that many specific questions and problems have already been submitted in many instances by the railways themselves. He expressed the opinion that these problems cannot be solved by any one person or agency but that with the help of all interested a definite procedure can be developed which holds promise of solving most of the important questions relating to equipment which now confront the railways.

New Officers Elected

The officers of the division elected at the thirteenth annual meeting in 1932 have served for the past three years and, since the rules of order of the division provide for the election of officers at the regular meeting in June of each even year, officers were elected at this meeting to serve until June 1936. Those elected are: chairman, O. A. Garber, chief mechanical officer, Missouri Pacific Lines; and vice-chairman, W. G. Black, vice-president, Chesapeake & Ohio. E. B. Hall, general superintendent of motive power and machinery, Chicago & North Western, the retiring chairman, was elected a member of the General Committee, and J. A. Power, superintendent of motive power and machinery, Southern Pacific Lines in Texas and Louisiana, and H. B. Bowen, chief

of motive power and rolling stock, Canadian Pacific, were re-elected members of the General Committee to succeed themselves.

In presenting its report the Nominating Committee recommended that the rules of order of the Division be amended to provide for a reduction in the membership of the General Committee from 16 to 12, including the chairman and vice-chairman.

O. A. Garber
Vice-Chairman and
Chairman-Elect

Report of Committee on Safety Appliances

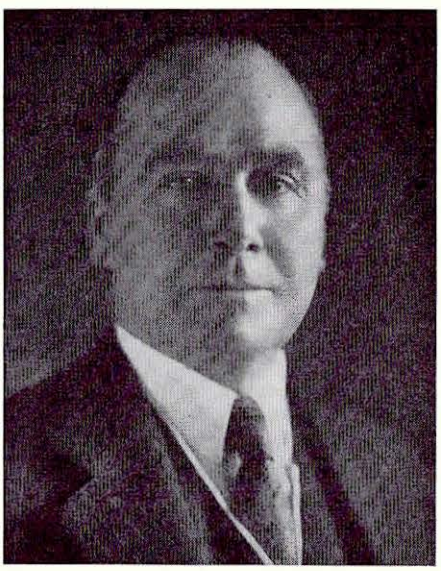
Data received from a number of railroads giving results of observations of metal running boards in service are being analyzed and tabulated in the preparation of a report to be made on this subject.

This committee has been furnished a copy of the minutes of the joint meeting of the Committee on Standardization of Geared Hand Brakes, held at Chicago, April 18, 1935, and is cooperating with the Committee on Car Construction and the Committee on Brakes and Brake Equipment in reviewing the proposed recommendations and rules which will be incorporated in the report of the Committee on Brakes and Brake Equipment to the 1935 Annual Meeting.

Director of Automatic Train Line Connector Investigation, Harley A. Johnson, reports that laboratory tests have been completed on all connectors submitted, and these data are being analyzed and tabulated in the proper form for preparation of report on the rack test. Report of the laboratory tests will be closed as soon as possible.

The report was signed by: R. G. Henley (chairman), superintendent of motive power, N. & W.; F. W. Hankins (vice-chairman), chief motive power, Penna.; C. J. Bodemer, superintendent of machinery, L. & N.; F. H. Hardin, assistant to president, N. Y. C. lines; J. Purcell, assistant to vice-president, A., T. & S. F., and J. J. Tatum, general superintendent of car department, B. & O.

Action.—The report of the committee, including the progress report of the director of research on automatic train line connectors, was accepted.



W. G. Black
Vice-Chairman-Elect

Report on Electric Rolling Stock

On account of continued general business conditions, no meetings were held during the year. The committee selected two subjects which it thought would be of interest in the handling of electric locomotives as follows:

1—Allowable Temperature Rise for, and Effect of Heating on Motor Insulation.

Subcommittee: R. Beeuwkes, chairman, J. W. Sasser and J. H. Davis.

2—Advantages in the Use of Anti-Friction Bearings in Traction Motors and Main Journals of Multiple-Unit Cars and Electric Locomotives with Respect to Operation, Maintenance, and Conduction of Current Through Parts.

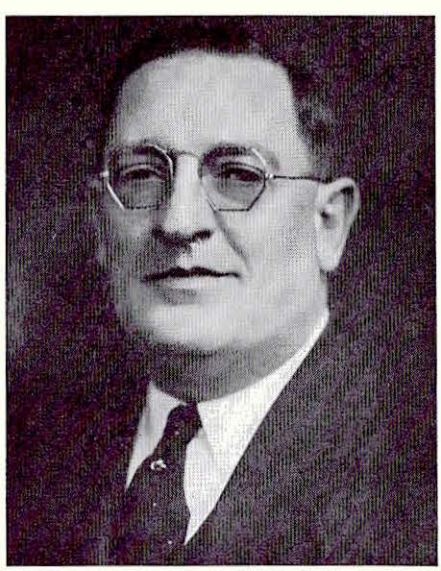
Subcommittee: W. S. H. Hamilton, chairman, A. L. Ralston and J. V. B. Duer.

The subcommittee handling the first subject found that a committee of the American Standards Association was working on the same matter and, not wishing to duplicate their work, it was decided to drop this subject.

In order to make a comprehensive and complete report on the second subject, it was thought by the subcommittee that the subject was of sufficient importance to require a more extensive investigation on the various railroads using anti-friction bearings in order to incorporate in the report their experience with these bearings on armatures, suspension and quill bearings on traction motors, and journal bearings on electric locomotives and MU cars. In this investigation the committee proposes to secure information and report on the following points:

1—Effect on starting friction.
2—Effect on schedules particularly as applied to MU trains.
3—Effect of propulsion current passing through the bearings.
4—Energy saving resulting from use of anti-friction bearings.
5—Relative cost of maintenance between plain and anti-friction bearings.

It is proposed to send out a brief questionnaire to a number of representative roads covering the above and ask for information and opinions on the various points outlined. The subcommittee will then be able to compile the data and present conclusions for consideration by the full committee. On account of present economic conditions and the importance of this subject,



V. R. Hawthorne
Secretary

Moffitt Studio

it is recommended that this be carried over as a subject for next year, which will enable us, we believe, to complete the study.

Exhibit No. 1, as prepared by J. V. B. Duer, electrical engineer of the Pennsylvania, gives a resume of the new electric locomotives which have been placed in the New York-Washington passenger service. We are giving this brief write-up in our report as we believe this will be interesting to the members of the A. A. R.

Exhibit No. 1—Pennsylvania Electric Locomotives

By J. V. B. Duer, Electrical Engineer

Early in 1934, the Pennsylvania decided that for its through New York-Washington passenger service, more powerful locomotives than the P5 type, of which 64 were in service, would be desirable. During the spring and summer of 1934, two new types of locomotives were designed and one of each type was built. These were designated as classes GG1 and R1. After extensive tests during the fall of that year, the class GG1 was selected.

Simultaneously with the preparation of the two new designs, the cab of the P5 class was re-designed to give stream-lined contour and to provide a single central motorman's compartment at the middle of the locomotive. Twenty-eight of these modified engines have been completed and are in service.

Fifty-seven additional class GG1 locomotives are to be built, delivery having already started, and completion being expected early in the summer. This locomotive is of the articulated-truck type, each of the two coupled main trucks, or frames, including three pairs of driving axles and a four-wheel guiding truck. A stream-lined cab rests on center plates and spring pads on the two main frames. Cab strength is provided by two trusses, framed into the cab and extending between center plates. The cab frame structure is riveted but the side and roof sheets are welded, making a perfectly smooth exterior, without rivet heads. The heating boiler, transformer with allied apparatus, and two operating compartments, are in the central portion of the cab. Hoods at either end house oil and water tanks, blowers, etc., and support the pantographs.

The locomotive has six twin motors carried in the main frames, one over each driving axle. The wheels are driven through gears, quills, and a flexible spring drive. The continuous horsepower is 4,620 at the maximum operating speed of 90 m.p.h. An oil-insulated, forced-cooled transformer is used.

The coupled length of the locomotive is 79 ft., 6 in.; the rigid wheel base is 13 ft., 8 in.; the total weight is approximately 460,000 lb., with approximately 300,000 lb. on drivers.

As fast as these locomotives are completed they will be placed in passenger service and the older P5a locomotives with box cabs will be placed in freight service. This eliminates further construction of the class L6a freight locomotive originally contemplated.

The report was signed by: R. G. Henley (chairman), superintendent motive power, N. & W.; J. H. Davis, chief engineer electric traction, B. & O.; J. V. B. Duer, electrical engineer, Penna.; J. W. Sasser, superintendent motor power, Virginian; R. Beeuwkes, electrical engineer, C., M., St. P. & P.; W. S. H. Hamilton, equipment electrical engineer, N. Y. C., and A. L. Ralston, general mechanical superintendent, N. Y., N. H. & H.

Action.—The report was accepted.

Report on Locomotive and Car Lighting

Your committee would beg to report that cooperating with the Director of Research in his study on air conditioning of passenger cars, with particular reference to standardization of terminal servicing conditions, a meeting was held in the rooms of the Association on October 3, 1934, and, as a result of the conference at that time, recommendations were submitted by letter ballot—Circular No. D. V.—825—for adoption as recommended practice the following items:

1. That all stand-by motors on air conditioning cars be connected for operation on a 220-volt, 3-phase, 60-cycle source of power.

2. That plugs and receptacles be in accordance with attached detailed drawings. Plugs for use in electrified zones should be arranged so that the plug handle, to which the ground connection is made, is insulated from the housing and further that the housing be furnished with a projecting stop to prevent receptacle cover coming in contact with plug handle. These precautions have been found necessary in electrified zones to overcome difficulties encountered due to potential differences.

3. That leads from transformer to receptacle on right-of-way and cord and plugs be so connected that when T1, T2, and T3 on plug on car end of cord are connected to similarly marked motor leads, phase rotation will be clockwise when facing end of motor opposite compressor drive.

4. That receptacles in parallel be located on the car in such manner that the car may be readily serviced from either side.

The report was signed by W. E. Dunham (chairman), superintendent car department, C. & N. W.; E. P. Chase, foreman, Penna.; O. M. Bixby, assistant engineer, N. Y. C.; E. Wanamaker, electrical engineer, C. R. I. & P.; A. E. Voigt, car lighting engineer, A. T. & S. F.; F. O. Marshall, electrical engineer, Pullman Co., and P. J. Callahan, supervisor car and locomotive electric lighting, B. & M.

Action.—The report was accepted.

Report on Specifications for Materials

Your committee, during the past year, has reviewed all of the specifications within its charge and, acting by direction of the General Committee, has revised the greater number of them to bring them up to date or to include additional grades of material that are desired by some roads.

The object, as expressed by the General Committee, was to make the specifications acceptable to all members of the association with a view to having them used in preference to specifications of individual roads. This is a difficult object to attain completely because of the continual change in requirements going on all the time under modern conditions. A railroad is of necessity compelled to change its specifications to meet the requirements of a new design and sometimes material is used which is experimental and not sufficiently tried out to warrant its being included in a standard specification. We have therefore endeavored to cover material used in interchange or material that is known from long use to be satisfactory and would request that members using these specifications and finding them inadequate in some respects for their needs, will at once advise the Secretary their criticisms and suggestions for improvement so that the committee may benefit therefrom.

As explained in Circular D. V. 824, January 7, 1935, the specifications have been numbered and grouped according to kind of material to facilitate finding them in the Manual and designating them on orders.

These revisions were approved by letter ballot but subsequently there was a request from the manufacturers to make a few changes in steel castings M-201 and in M-101 axles, M-102 and M-103 forgings and M-105 billets. These changes were slight and were reported to the secretary with request to take care of them in printing. This has been done; but since the action was taken after the letter ballot your committee requests that the usual motion for action on this report carry with it approval of the changes.

A revision of specifications for steel sheets and thin plates M-117-26, has been prepared after extended discussion with the manufacturers in which we have agreed as to tolerances with the exception of tolerances on buckles which have been made to suit the requirements of the consumers. These specifications are submitted as M-117-35.

Your committee has before it consideration of specifications for bolts and nuts and a revision of specifications for rivets to agree with the recommendations of the American Standards Association. So far these specifications have not received official approval but it is expected that they will be available during the coming year.

The report was signed by: F. M. Waring (chairman), engineer of tests, Pennsylvania; T. D. Sedwick (vice-chairman), engineer of tests, C., R. I. & P.; C. P. VanGundy, engineer of tests, B. & O.; F. Zeleny, engineer of tests, C., B. & Q.; H. G. Burnham, engineer of tests, N. P.; J. C. Ramage, engineer of tests, S.; H. W. Faus, engineer of tests, N. Y. C.; E. E. Chapman, engineer of tests, A., T. & S. F.; A. G. Hoppe, engineer of tests, C., M., St. P. & P.; H. P. Hass, engineer of tests, N. Y., N. H. & H., and J. R. Jackson, engineer of tests, M. P.

Discussion

F. H. Hardin, assistant to the president, New York Central, called attention to the large amount of work involved in reviewing all of the specifications and making extensive revisions to bring them up to date. He moved that a rising vote of thanks be given the committee, which was done. C. T. Ripley, chief mechanical engineer, Atchison, Topeka & Santa Fe, also commented on the comprehensive character of the work of the committee and supplemented Mr. Hardin's remarks, urging that the recommendations of the committee be adopted generally and put into use by all railroads; otherwise the committee's work will be largely nullified.

Action.—The report was accepted and the revised specifications, as well as new specifications, were ordered submitted to letter ballot.

Report on Car Construction

In 1932 a new program was presented and later approved by the Mechanical Division under which it was proposed to produce designs of the principal types of freight equipment cars for general interchange service, representing in each case, the latest state of the designer's art with reference to weight, cost, construction, strength and general utility and of such character that any road might properly and consistently adopt these designs as standards and construct thereto their future cars of the types thus developed.

The same year the first design of steel-sheathed wood-lined box car was completed under this program, submitted and adopted by a large majority as standard.

Since 1932 this work has been carried on in the face of an unusually difficult situation, but thus far the A. R. C. I. has generously contributed the time and efforts of its chief engineers and designing organizations with the result that the work has proceeded without undue delay or interruption.

In view of these circumstances, it is regarded as a fair statement that the progress made, and the potential future value of this work have been well worth the effort and when recognizing the economic value of standard car designs kept up to date, on which subject a brief discussion was included in Appendix "A" of the 1932 report—it is believed to be to the best interests of both builders and roads to continue vigorously to prosecute the work still before the joint committee, especially during a period such as the present, in order that a sound foundation for progress may be maintained.

For the past year or two, certain builders have been and now are independently engaged in developing and producing new alloy-steel designs of substantially reduced light weight for the purpose of justifying and creating, if possible, demands for replacement of older existing equipment with more efficient cars, but regardless of these undertakings, the joint work on new standard designs already completed in no sense represents wasted effort because the latter may be, and in more than one instance already has advantageously been used as the basis for such experimental work. Furthermore, it is a reasonable assumption that this procedure will be followed in the future because each car builder thus is placed in position directly to benefit from the joint experience and work of all concerned.

Whether or not full advantages are to be derived from progressive standardization of freight equipment depends largely, if not almost entirely on the attitude and position taken from this time on by the A. A. R. in the matter of building the standard designs or the still lighter weight units in high-tensile steels or other materials based thereon when cars of these types are required.

Steel-Sheathed Wood-Lined Box Car

Last year we stated that five sample cars had been built, two of which later were subjected to complete extensometer, deflectometer and impact tests in comparison with two previous designs of the same type and that complete reports with definite conclusions had been circulated.

Following the impact tests which, for all three designs were conducted under full axle loads and carried well beyond collision conditions almost to the point of major failure in each respective structure, necessary repairs were made, after which all of the A. A. R. cars, except one, were assigned to member roads for regular revenue service.

Car No. 4, which had been put through the complete deflection and impact test program, was turned over to the C. & O. for road service tests under full axle load, for comparison with C. & O. companion car No. 8740.

Due to difference in light weight, the lading load carried in these tests by the A. A. R. car is 3,900 lb. greater than for the companion car. As soon as practicable, the complete report will be made available as a further check on the A. A. R. tests.

Self-Clearing Hopper Cars

Descriptive analysis, specifications and complete sets of the principal drawings for 50- and 70-ton nominal capacity proposed standard hopper cars have been completed during the past year by the American Railway Car Institute Committee on Design in close co-operation with your committee under the same program and procedure followed in the production of the steel-sheathed box car presented in 1932, and are submitted herewith in Appendix A.

Recently Constructed Hopper Cars.—During 1934 the C. & O. placed orders for 6,000 and the Erie 2,500 50-ton nominal capacity hopper cars and, although the work on the A. A. R. standard cars had been started at that time, the design features had not been fully agreed upon and a number of important details remained to be settled. However, these roads were desirous of following as closely as practicable under the circumstances the A. A. R. design features and as a result the cars as built conform closely therewith, the principal deviations being as follows:

Height from rail to top of side 10 ft. 4 in. instead of 10 ft. 8 in. because the average weight of lading to be handled exceeds somewhat the figure of 52 lb. per cu. ft. used in the A. A. R. designs. The former standard A. A. R. center-sill section of 30.19 sq. in. was used, together with the former standard center-plate height of 26¾ in., in view of the fact that at the time the orders were placed sufficient information was not available to justify, in the opinion of the purchaser, the use of the new Z-bar section of somewhat reduced cross-sectional area. Pressed steel side stakes were used in place of the rolled sections now shown on the A. A. R. drawings. The sample car of a lot of ultra light-weight hopper cars produced by a builder was completed during October, 1934. This development is described further in Appendix A.

Refrigerator Car

The work on the refrigerator car is now in shape where active design may be undertaken as a co-operative effort among the Car Construction Committee, the car operators, the car builders (A. R. C. I.) and such manufacturers as may be involved. From this point onward, the standard car development program submitted and accepted by the Mechanical Division in 1932 is to be followed with a view to completing the work as promptly as possible.

Steel-Frame Single-Sheathed Box Car

As a number of important roads require this type of car, your committee is under instructions to have prepared a design based on the standard steel-sheathed wood-lined car. This is now being produced as a cooperative effort of the A. R. C. I. and this committee.

Equipment Clearances and Maximum Outline

As reported last year, the diagram adopted by the A. R. E. A. in 1934 as the "Limiting Equipment Diagram for Interchange Service" contained no reference to the fact that cars to these dimensions are subject to operating restrictions. A conference was held with representatives of the Engineering Division to straighten the matter out and agreement was reached that this diagram, with certain detail changes decided upon, should be revised and set up as the "Maximum Outline for Equipment in Restricted Service." It was further agreed that from information previously obtained a limiting diagram for unrestricted interchange, somewhat larger than present Plate B, could be developed and that this would be done.

It is necessary to report that the large diagram for restricted operation has not been revised and the improved diagram based on Plate B for unrestricted service has not as yet been developed. Action has been taken, however, to have this work completed as promptly as possible so that these two diagrams may be available.

Light-Weight Trucks for Freight Cars

During 1930 the problem of further weight reduction in side frames and bolsters was again taken up with the manufacturers with a view to obtaining, if found practicable, the benefits accruing from the advancement in the metallurgical art as represented by high-tensile steels then being developed and offered for use.

As a basis for this development it was tentatively established that these parts should meet the same permanent set and other strength requirements as prescribed in the A. A. R. 1929 specifications when made of Grade B carbon steel but that increased deflection would be unavoidable on account of lighter sections and reduced moments of inertia and the fact that the modulus of elasticity of high-tensile steel is practically the same as that for Grade B steel.

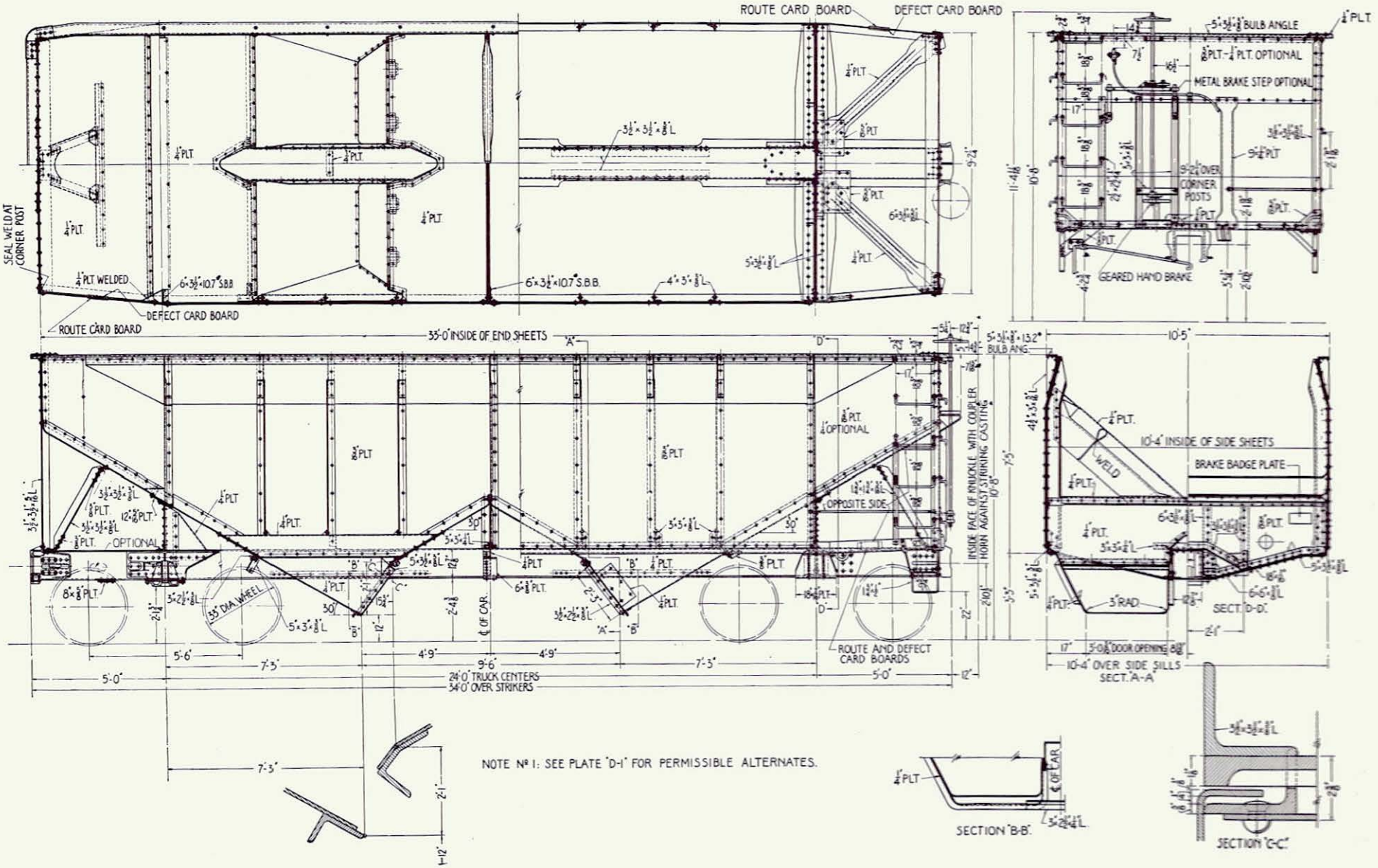
To meet these test requirements with the minimum sections practicable for production of side frames and bolsters and to have proper ductility, the following were tentatively established for the minimum physical properties of the steel to be used:

Tensile strength, lb. per sq. in.	90,000
Yield point, lb. per sq. in.	60,000
Elongation in 2 in.	22 per cent
Reduction of area	45 per cent

A manganese-vanadium steel, double-normalized (not liquid quenched), was used which met these physical requirements. This material showed a ductile behavior in side frames and bolsters under static test similar to that of Grade B carbon steel. The approximate chemical composition is as follows: Carbon, .30; manganese, 1.65; vanadium, .10.

This material was used, not as a limitation against other suitable steels but because of previously developed knowledge of its properties.

Special light designs of 50- and 70-ton side frames and bolsters were then prepared, proportioned by careful calculation and from knowledge gained during previous experiments. The A. A. R.



NOTE Nº 1: SEE PLATE "D-1" FOR PERMISSIBLE ALTERNATES.

Elevation and Sections of Proposed A. A. R. Standard 50-Ton Hopper Car—70-Ton Car Is of Similar Design and Has Three Hoppers

specification limits for design fibre stresses were exceeded in the calculations because of the use of high-tensile steel and reduction in sections.

Static Tests.—Patterns were then constructed, sample castings made and checked, followed by the production of castings which were statically tested under A. A. R. 1929 requirements. From the data thus secured, further improvements in design were made and this procedure was successively repeated.

Dynamic Tests.—The present A. A. R. specifications purposely were formulated so as to provide for acceptance under static tests only when using Grade B steel, but the background for these test requirements with this material had previously been established through a prolonged series of dynamic tests and research.

In the present developments of lightened high-tensile designs, it is necessary in the interest of both manufacturers and users for such frames of each design and capacity produced to be subjected to complete dynamic tests, preferably on both manufacturers' machines now available, in order to develop the required background on which static test and design requirements ultimately may be based for inclusion in the specifications covering acceptance test and this procedure is being followed. However, consistent with present testing procedure for Grade B frames, dynamic test requirements are not to be incorporated in the specifications for high-tensile steel frames.

It is not the purpose of this report to submit further discussion of the details but it is desired to state that tentative agreement has been reached among the manufacturers' engineers committee and the A. A. R. committees on Specifications for Materials and Car Construction on test requirements for current use in the production of high-tensile side frames and bolsters now being placed in service. Furthermore, it is agreed that such castings of each new design, material or combinations of both are to be subject to the joint approval of the two A. A. R. committees mentioned until such time as specifications for acceptance under static tests may be produced.

Marking for High-Tensile Frames and Bolsters.—At present frames and bolsters of Grade B steel are required to be marked "AAR-29," the numerals corresponding to the year in which the present static-test specifications were adopted.

For purposes of identification, the committees on Specifications for Materials and Car Construction have agreed that approved high-tensile frames and bolsters are to be marked "AAR-HT-35." In this case the numerals correspond with the year in which tentative test specifications have been set up.

Comparisons of Truck Weights.—The following tabulations, supplemented by brief comment, are presented to illustrate the progress which has been made in the actual production of high-tensile frames satisfactory to the committees on Specifications for Materials and Car Construction for interchange service.

Spring-Plankless Truck.—A spring-plankless self-alining truck has been under development by the Truck Manufacturers' Engineers Committee. The design incorporates specially shaped engaging surfaces between the bolster and side frame columns so that alinement is maintained with large uniform bearing contact, in the absence of the spring plank. Provision is also made on the side frames for attachment of a brake-beam safety device. Some trucks of this design are now in service. This type of truck can be made either of Grade B or high-tensile steel and castings for both designs have passed satisfactory static and dynamic tests.

Comparative Weights (Pounds) per Car Set Spring-Plank Trucks vs. Spring-Plankless Trucks—Items Affecting Weight of Complete Trucks

	Journal Size					
	Grade B Castings			High-Tensile Castings		
	5 in. by 9 in.	5½ in. by 10 in.	6 in. by 11 in.	5 in. by 9 in.	5½ in. by 10 in.	6 in. by 11 in.
SPRING-PLANK TRUCKS						
Side frames	2,090	2,390	2,970	1,800	2,000	2,400
Truck bolsters	1,455	1,595	2,085	1,170	1,260	1,570
Spring planks	380	448	570	380	448	570
Brake beam safety attachments	40	40	40	40	40	40
Total	3,965	4,473	5,665	3,390	3,748	4,580
SPRING-PLANKLESS TRUCKS						
Side frames	2,162	2,462	3,050	1,852	2,052	2,460
Truck bolsters	1,469	1,633	2,113	1,180	1,290	1,592
Brake beam safety attachments	77	77	79	77	77	79
Total	3,708	4,172	5,242	3,109	3,419	4,131
Saving per car, in favor of Spring-Plankless	257	301	423	281	329	449

The principal object of producing the spring-plankless truck was to achieve further weight saving without sacrifice of strength or service stability but, with this truck spring-plank maintenance difficulties also are eliminated. For direct comparisons of weight savings, the table has been prepared showing the spring-plank type vs. the spring-plankless type trucks in both Grade B and high-tensile steel.

Coileaf Spring-Plankless Truck

The National Malleable & Steel Castings Company has produced another design of spring-plankless truck designated as the Type "B" Coileaf with which a combination consisting of a double-helical spring assembly and a semi-elliptic spring to support the bolster is positioned within each side frame. The principal objectives sought in this design are reduced weight and improved riding characteristics, and it is understood that in addition to the regular Type "B" a light-weight design also has been developed. With this truck, it follows that the difficulties and expense of spring-plank maintenance are eliminated.

Detail information regarding comparative weights, together with corresponding static and dynamic test results for the two designs are not yet available, but your committee expects that in due course full report may be formulated.

Bottom Rod and Brake Beam Safety Supports

There are in service many types of brake-beam safety supports secured either by loose-fitting bolts or by rivets not properly filling the holes and these have caused considerable trouble by becoming disengaged due to improper application and poor maintenance.

The experience of a number of roads in applying devices shown on pages E-3-4-4A and 4B of Section "E" of the Manual by riveting and welding the supports to the spring plank in accordance with notations given on these sheets developed that the devices have been successfully held where the single-angle auxiliary support is applied. With a single angle attached near the center it is not necessary to detach same in order to remove or apply a brake beam.

The importance of good workmanship should not be overlooked. It is necessary that rivets be of the size called for and be properly driven to fill the holes and that the portions to be welded be properly cleaned and welded in accordance with the notations given on the drawings.

There are in service proprietary devices different in design from the non-patented devices given in the Manual, also others which have been developed since 1932 and have been submitted to and approved by the Car Construction Committee, any one of which will provide efficient safeguards in case of failures of brake hangers or connecting parts and still permit accessibility in application and renewal of brake beams without cutting attachment rivets which should not be disturbed.

While the difficulties of brake beams dropping down due to failures of hangers may be minimized by improved materials, better designing and proper maintenance of brake-beam hangers and pins, it is considered necessary to provide and maintain on all cars in interchange service efficient and economical safety supports for the bottom rod and brake beams.

Truck Springs

Non-Harmonic Spring Devices.—Under date of April 19, 1934, a progress report, showing results of the laboratory and road tests, conducted for the purpose of determining the riding characteristics of existing truck springs and to ascertain to what extent these characteristics could be improved by the use of available devices, variously designated as friction springs, snubbers and stabilizers, or by the use of trucks of special design, was issued. Following completion of the laboratory and road tests, the various devices tested were placed in service—two car sets of each—under General American Transportation Company refrigerator cars to obtain comparative information as to endurance qualities. The endurance test is still in progress. The plan being followed is to inspect each car every six months, at which time springs or special trucks are removed and subjected to a calibration test in the A. A. R. laboratory at Purdue University. After this they are reapplied for another service period of six months.

The final report will include recommendations with respect to additional tests or other investigations that in the opinion of the sub-committee should be made. This progress report, together with the fact that these tests are being conducted, should not be construed as a deterrent by those contemplating application of such devices.

Helical Spring Groups

A subcommittee is now developing new designs of helical springs to be designated as C, D, H and P for the 40-, 50-, 70- and 100-ton nominal capacity trucks. These designs will be prepared to

interchange in the space now occupied by the present A. A. R. spring groups.

Truck Spring Planks

Early in 1934 attention of the committee was called to the trouble some roads were having with spring plank breakages, and a sub-committee was appointed to make a study of this trouble. The Truck Manufacturers' Engineers Committee was invited to assist in this study. Several designs of spring planks to eliminate this breakage are now being tried by various roads, and new designs of trucks without spring planks are being built.

Some of the trouble experienced with breakage of spring planks is caused by lack of rigid inspection at time of assembling trucks, and due to close fit of spring planks on truck side-frame bosses. It is recommended that A. A. R. Plates 23, 24 and 25 for 40-, 50- and 70-ton cars be modified to show 2 1/32-in. holes for side-frame bosses changed to 2¼ in. diameter to permit additional clearance and more flexibility in the truck. This committee also suggests that roads experiencing trouble with spring-plank failures would find relief if existing spring planks were changed by reaming the side frame boss holes to provide a total clearance of ¼ in.

Rail Motor-Car Axles

The last report contained a statement that Rolling Stock Committee No. 1 of the American Transit Association had made final report with recommendations as shown in the 1933 supplement to the Engineering Manual, Section E-3-33 covering Design of Axles for Electric Railway Motors. Further, that these recommendations had been approved by that association.

Subsequently the A. A. R. committee on Specifications for Materials was requested to check the A. T. A. specifications against the A. A. R. specifications covering materials for passenger service axles and to advise as to what specifications should be followed for rail motor-car axles.

During the past year the committee on Specifications for Materials has revised a large number of A. A. R. specifications, including those for the different grades of axles, and consequently that committee is now in better position to conclude this assignment.

As soon as advice requested is received, it is proposed to issue a special letter ballot on designs and materials for the different types and capacities of axles required for rail motor car service. If approved, these specifications will be incorporated in the Manual.

Standard Center Plate

As stated in the 1934 report, a center plate having nominal diameter of 12 in. is the present A. A. R. standard for the 2-C, 2-D and 2-E trucks regardless of differences in load-carrying capacities or corresponding bearing pressures. The first standard adopted in 1903 for 80,000- and 100,000-lb. capacity cars was of 12 in. nominal diameter and since that time only minor changes in detail dimensions have been made.

As a result of a study now completed and in view of replies received to an inquiry circulated to the voting members, a center plate having nominal diameter increased from 12 in. to 14 in. has been included in the design for the new proposed A. A. R. standard 70-ton hopper car, submitted in Appendix A.

Briefly stated, the reasons for this change are as follows:

(1) Reduced bearing pressures; (2) less cutting of center plate surfaces and reduced wear on wheel flanges and movable truck parts; (3) reduced resistance to swivelling.

Table VII for 70-ton cars with nominal load on each center plate of 96,000 lb. and for 50-ton cars at a center plate load of 76,700 lb. is here presented in order to illustrate the situation with respect to 12 in. and 14 in. diameter center plates:

It is recommended that the 14 in. diameter center plate be made standard for all future cars of 140,000 lb. nominal capacity and that this item be submitted to letter ballot.

Table VII

1	2 Nominal center plate load 96,000 lb.		3 Nominal center plate load 76,700 lb.	
Nominal diameter	Net area, sq. in.	Bearing pressure, lb. per sq. in.	Net area, sq. in.	Bearing pressure, lb. per sq. in.
12 in.	81.67	1172	81.67	940
14 in.	119.35	804	119.35	642

Note Total truck weight per car set used in Column (2) is 18,000 lb. and for Column (3), 15,600 lb.

Hand Brakes

Due to increasing use on freight cars of numerous designs of so-called "power" or geared hand brakes in which various features of design are incorporated, which in turn directly affect operating characteristics, application and maintenance, the Car Construction Committee decided about two years ago that it would be necessary to standardize on basic features before the situation reached the point where the number of different devices in service would make such standardization more difficult and expensive, if not impracticable. This conclusion was reached with full knowledge that satisfactory conventional non-proprietary types of hand brakes were available and in general use.

During recent months this study, which includes geared hand brakes of the vertical wheel, horizontal wheel and lever types, has been proceeded with in cooperation with the committees on Brakes and Brake Equipment and Safety Appliances. The tentative specifications as first set up cover all features jointly agreed upon and concurred with in principle by the Director of the Bureau of Safety of the I. C. C., whom your representatives have consulted.

It is desired to emphasize the fact that from the outset the formulation of the proposed fundamentals for geared hand brakes has been proceeded with for the purpose of making these requirements applicable only to future hand-brake applications and with the understanding that such specifications or rules pertaining thereto, are not to apply to existing installations. Furthermore, there is no desire, disposition or intention on the part of the joint sub-committee or the main committees involved, in any way to restrict development or progress in this art.

Condensation in Box Cars

A progress report was presented last year based upon extensive winter weather field work in loading hot flour and cereals in four Pennsylvania steel-sheathed wood-lined box cars and inspecting condition of loading at destination. With the cooperation of the Freight Claims Division, the Freight Containers Bureau and the Director of Research of the Mechanical Division, the investigation was continued last winter under a jointly formulated program and with the benefit of the previous year's experience.

Through cooperation and assistance of the Chicago Great Western, four steel-sheathed, fully wood-lined box cars were assigned to the test and specially fitted up for the purpose of the investigation. Each car was equipped with four observation windows, internal lighting, observation trap doors in side and end lining, and in the roof linings where used. Each car was provided with 12 electrical resistance distant-reading thermometers with extensions leading into an office car also provided by the C. G. W.

It had been previously determined that all phenomona connected with interior condensation occur within 48 hrs. after loads are completed and must be observed within that period. In-transit tests were therefore abandoned in favor of standing tests, resulting not only in continuous and accurate observations throughout the critical period, but also in a decided acceleration of the program. For this purpose the cars after loading were set on a spur track, kept under observation throughout the critical period, opened and the contents checked as unloaded at the warehouse platform.

Realizing that condensation is not confined entirely to roof sweating, the four test cars were prepared with the following interior treatment:

Car No. 1.—Wood-lined—plain painted steel ceiling as from builder.

Car No. 2.—Same as car No. 1 except it has also a wood ceiling.

Car No. 3.—Same as car No. 1 except it has all inside metal surfaces, including side and end sheets back of wood lining, sprayed with sawdust applied on an asphalt emulsion.

Car No. 4.—Same as car No. 3 except it has also a wood ceiling.

The investigation starting December 5, 1934, ending February 5, 1935, was favored by a variety of weather and temperature conditions. It is believed that this investigation is as thorough and comprehensive and the conclusions as accurate as are possible or necessary for a final disposition of the problem. A brief statement of the facts developed during the progress of the tests is as follows:

1. Condensation appears during construction of the load in all cars during all "Hot" lading tests, showing on windows and extreme top of doors.

2. No visible change from the above condition is found in any of the cars for a period of approximately one and a half hours after doors are closed on the completed load.

3. Following the above period, condensation becomes visible to an increased extent showing mostly on windows and unprotected metal surfaces.

4. Condensation appears in the form of frost when outside temperatures are 20 deg. F. or lower, and in the form of

moisture when such temperatures are higher than 20 deg.

5. During the progress of the tests, frozen condensation on unprotected steel ceilings melted when outside temperatures went above freezing or about 20 deg. F. with a bright sun.

6. Condensation above wood ceiling is in extent and degree somewhat less than on unprotected metal roofs.

7. Condensation was found on metal surfaces back of all the wood linings, to a greater extent above the load level than below.

8. Temperatures of the flour and cereals at the packing floor and at the car were practically the same.

9. Temperatures of the flour and cereals in the load reduced during the period of the tests, depending upon outside temperatures. Cases and bags in the top layer and adjacent to the sides of the cars were brought to a lower temperature than were those in the middle of the load.

10. Flour or cereals pre-cooled to 50 deg. F. will not produce condensation to a dangerous extent in all-steel box cars. This fact is an outstanding feature and *pre-cooling the "hot" lading is the only known practical means of eliminating condensation in all-steel cars at hand.*

Conclusions.—The sum of the conclusions gives but one answer—supplementary structures inside of steel box cars, such as wood ceilings, cork or sawdust layers, etc., on steel surfaces are wholly inadequate to cope with the moisture developed with "hot lading" in outdoor temperatures below freezing. To exceed such supplementary construction is economically and practically prohibitive, encroaching on the realm of refrigerator-car construction and insulation. It is estimated that in temperatures below 20 deg. F., with box cars carrying "hot lading," as much as 60 gal. of water per car are developed from condensation under unfavorable atmospheric conditions. As a result of these conclusions which have been determined after two years of fair and impartial investigation under a wide range of weather and temperature conditions and bearing in mind the comparatively small percentage of claims for damage that can be definitely traced to sweating and not to leakage at roofs, doors, etc., the committee believes that there is no form of interior treatment of the steel box car within economic practicability that will wholly prevent condensation from affecting "hot" loads unless pre-cooled to 50 deg. F. or less. While these tests have shown some slight degree of amelioration of the conditions which it is sought to correct, it does not extend to a degree sufficient, in the opinion of the committee, to warrant the expenditure necessary thus to equip the cars coupled with the cost of hauling the extra dead weight.

Different methods of interior treatment have been tried in an effort to prevent or retard condensation. A typical method, for example, is to line under the roof with wood lining. Such treatment results in 1,000 lb. to 1,200 lb. additional dead weight, and a cost of $55.00 to $60.00 per car.

In 1932 a typical large road loaded 1,356,081 box cars (including l.c.l. freight). The total of cars loaded with flour was 25,592 or 1.89 per cent of the whole. This provides a fair idea of the expense which might be incurred as compared with, not only the claims involved, but the small percentage of such claims as can be established as due to damage from actual condensation. The committee concludes that a special type of car is not established or justified.

[The progress report submitted by the subcommittee was unusually full and complete. It included photographs, charts and tables of the data obtained together with a full description of the tests conducted.—EDITOR.]

Malleable Castings

About two years ago your committee was requested again to review the question of using malleable iron castings in freight-car construction and advice has been received from the Malleable Iron Research Institute that the following physical properties may now be demanded:

Yield point at least 35,000 lb. per sq. in.; elongation 18 per cent in 2 in.; ultimate strength 55,000 lb. per sq. in.

It is stated by the Institute that malleable iron may be produced in sections of 5/16 in. as compared with 3/8 in. for electric steel and 7/16 in. for open hearth steel; also that malleable-iron machines more easily than steel castings, forgings or gray iron and that it can be produced in intricate designs smooth and true to patterns and suitable for application to rolled or finished shapes without grinding or finishing.

We have, therefore, reviewed this subject and for the guidance of those interested, the following list of parts is submitted:

FREIGHT CAR ITEMS FOR WHICH MALLEABLE IRON IS CONSIDERED A SATISFACTORY SUBSTITUTE FOR CAST STEEL

Brake-badge plate.
Brake-beam strut.
Brake head.
Body side-bearing brace.
Coupler carrier.
Corner cap, end and side plate connection.
Draft-gear cheek plates.
Draft-gear carrier.
Front follower block used with horizontal yoke attachments.
Hand-brake wheel, pawl, pawl plate and ratchet wheel.
Journal-box lid.
Push pole pocket.
Truck side-bearing housing, anti-friction type.
Uncoupling lever brackets.

NOTE.—This list is not intended to include all proprietary details which may be offered in malleable iron.

Definitions and Designating Letters for Cars

During the past year recommendations have been received relative to change in definitions for the "RS" Bunker Refrigerator car and "HF" Hopper car and requests have been made for new designating symbols and definitions to cover a Beef Rail Refrigerator car; Depressed Center Flat car and Special Type Insulated Enclosed car designed primarily for bulk sugar transportation.

The following are the proposed changes and new definitions. [Italics indicate new or principal changes.—EDITOR.]

CLASS "R"—REFRIGERATOR CAR TYPE

"RM"—*Beef Rail Refrigerator. A fully insulated house car equipped with either brine tanks or ice bunkers. Designed primarily for the use of combined crushed ice and salt and with or without means of ventilation. Equipped with beef rails and used chiefly for fresh meat and packing house products.*

"RS"—Bunker Refrigerator. A *fully insulated* house car equipped with ice bunkers. Designed primarily for use of chunk ice and with *or without* means of ventilation.

CLASS "H"—HOPPER CAR TYPE

"HF"—An Open Top Self-Clearing car, having fixed sides and ends and bottom consisting of two *or more* divided hoppers with doors hinged crosswise dumping between rails; also two divided hoppers extending from end of car to bolster, with doors hinged lengthwise of car and dumping outside of rails.

CLASS "F"—FLAT CAR TYPE

"FD"—*Depressed Center Flat. A flat car of special construction having the portion of floor extending between trucks depressed to provide necessary head room for certain classes of lading.*

CLASS "L"—SPECIAL CAR TYPE

"LS"—*A heavily insulated, self-clearing, permanently enclosed car, having fixed roof, sides and ends, and provided with openings for loading through roof and outlets at bottom for unloading. Top openings fitted with weather-tight covers and bottom outlets with leak-proof valves. Designed primarily for bulk sugar transportation.*

Blocking For Cradles of Car Dumping Machines

Your committee has prepared necessary corrections in the drawing shown between pages 44 and 45, Section L of the Manual, covering "Standard Blocking for Cradles of Car Dumping Machines," to provide clearance for additional grab handles now being applied to open-top cars. The text for this recommended practice has also been revised.

[Changes required in text were slight.—EDITOR.]

Letter Ballot Items

It is recommended that the following items be submitted to letter ballot:

Designs for standard Self-Clearing Hopper Cars of 50 and 70 tons nominal capacity.

Revision of standard specifications for Journal Box Lids.

Revision of design of standard Journal Bearing Wedges.

Revision of recommended practice covering standard Blocking for Cradles of Car Dumping Machines.

Revision of recommended practice Classification of Cars, Definitions and Designating Letters for.

The report was signed by P. W. Kiefer (chairman), chief engineer motive power and rolling stock, N. Y. C.; T. P. Irving (vice-chairman), engineer car construction, C. & O.; W. A. Newman, chief mechanical engineer, Can. Pac.; A. H. Fetters, general mechanical engineer, U. P.; J. McMullen, superintendent car department, Erie; F. A. Isaacson, engineer car construction, A. T. & S. F.; G. S. Goodwin, assistant general superintendent motive power, C., R. I. & P.; E. B. Dailey, engineer car construction, So. Pac.; B. S. Brown, general foreman, Penna.; K. F. Nystrom, superintendent car department, C., M., St. P. & P.; J. P. Laux, superintendent motive power, L. V., and H. L. Holland, assistant engineer, B. & O.

Discussion

In presenting the report Mr. Kiefer said that since the formal report was written the casting manufacturers had submitted drawings for alternate cast steel constructions of various groups of parts of the proposed hopper car designs and that the drawings were available for inspection by the members interested.

W. G. Black complimented the committee on its thorough and comprehensive report and moved a rising vote of thanks. He questioned the wisdom of using the same center sill section area in the hopper car design as in the box car, calling attention to the fact that there is a loss of 350 to 400 lbs. of weight per car annually due to corrosion and that a relatively much larger

amount may have to be spent in reinforcements of an inadequate design than would be required to increase sill section at the outset. In reply Mr. Kiefer said that all the information the committee had secured bore out its recommendation that the same sill section be used for both types of cars. The new bolster center filler casting, he said, takes the end shocks solidly and that the question of adequate strength was really a matter of securing sufficient rivets in the connection between this casting and the sills. W. E. Dunham, superintendent of the car department, Chicago & North Western, said that the vertical end-lining boards were the cause of the condemnation for cereal loading of many cars on that road and that the only way in which refuse could be cleaned out from behind the end-lining in these cars was to remove the lining from the car. He said that the Chicago & North Western had come to the conclusion that the horizontal end-lining boards would be applied to future cars because of this difficulty. He also said that after continuous difficulty from center plate failures on hopper cars a 15-in. center plate had been adopted, and that this had completely overcome the difficulties from wheel wear and center plate failures experienced with the former 12-in. plates. R. L. Kleine pointed out that the 25¾-in. center plate height on the proposed standard hopper cars was a variation from standards which destroyed interchangeability. In reply Mr. Kiefer said that the new center plate height was the one with which the least stresses were produced in the underframe and, using which, the least weight in the structure was required. For these reasons, he said, the committee felt that the departure from the former standard was fully justified.

Action.—The report was accepted and recommendations referred to letter ballot.

Report of Committee on Wheels

Chilled Iron Wheel Design

The Association of Manufacturers of Chilled Iron Car Wheels has been actively engaged in the development of the chilled-iron wheel. In order to facilitate the detailed study of various factors entering into the manufacture and service of chilled-tread wheels, this association has organized a research department to make a close study of the material from which the wheel is constructed, improvements in design and performance of wheels in service. Developments to date have resulted in a mass of detailed data, as well as the production of a design of cast-iron wheel of lighter weight than the present A. A. R. standard. The lightening of the wheel has been accomplished primarily by coring the hub section and reducing the thickness of the plate. The reduction in plate thickness is compensated for by improvement in metallurgy and foundry practice, controlled heat-treatment playing a major part in improving the physical properties of the metal. If the improvement in the quality of the chilled car wheel proves equal to what the preliminary tests now indicate, it will be necessary to modify materially the specifications covering the normalizing process of the finished wheel.

A few of these light-weight wheels have been applied to 50-ton light-weight box cars, and the committee has been requested to approve the use of a limited number of such wheels in interchange. This was gladly done, as the committee is heartily in accord with the efforts of the manufacturers. These light-weight wheels are identified by the marking "A. A. R. X."

The Association of Chilled Iron Wheel Manufacturers, in an endeavor to strengthen the rim, has added ¼ in. to the inside surface of the rim, the metal being obtained from the hub and the junction of the hub and plate sections. A limited number of such wheels, by consent of the purchaser, have been furnished and placed in service. The Wheel Committee has recommended that wheels of this type representing experimental design be marked "A. A. R. X." to indicate them as such. Note under Rule 3, Code of Rules, provides for wheels of experimental design thus marked to be accepted in interchange. The committee is awaiting with interest the result of this strengthening of the rim section. Until more information is available as to the advantage of this change, no alterations will be made in the existing standard design.

The committee is not prepared to make recommendation for the adoption of a straight-taper tread for cast-iron wheels. An extended test of straight-taper tread cast-iron wheels is being continued by one road for the committee's information. It now has about 20,000 of these wheels in service under refrigerator cars, but, in general, it must be said that the results with this type of tread are encouraging, but sufficient data is not yet available to warrant final report.

The committee has been in close touch with the extensive and helpful research work being carried on by the Association of Chilled Iron Wheel Manufacturers in connection with developments in design, material and heat treatment of their product.

[The committee here explained the proper use of the Worn-Through-Chill Gage which must not be applied for condemning an out-of-round wheel where the chill is not worn through. Drawings were also included covering special gages for multiple-wear, wrought-steel wheels and tires.—EDITOR.]

Machine Shop Practice

In the revision of the Wheel and Axle Manual the committee made special effort to amplify the information previously published with respect to wheel shop practices. It is the general opinion there is still an opportunity for marked improvement in the machining of axles and wheels for mounting, and in mounting practices. This applies not only to the railroads, but to commercial plants engaged in wheel mounting. There are altogether too many otherwise serviceable wheels being removed because there is indication they may be loose on the axle because of oil spots appearing on the inside face of the hub and plate of the wheel. Comparatively few wheels with such markings are found either actually loose or approaching such a condition, but such an indication, with proper consideration for safety, cannot be disregarded, and this is leading to unnecessary removal because of improper machine-shop practice in mounting the wheels. In order further to accelerate interest with respect to improving wheel-shop practices it is recommended that the A. A. R. mechanical inspectors give special consideration to the manner in which the machine work is being performed in the preparation of wheels and axles for mounting, as well as to the manner in which the mounting pressures are being developed.

One-Wear Wrought-Steel Wheel Specifications

In 1934 your committee presented specifications covering one-wear solid wrought-steel wheels. These were later adopted by letter ballot. Since the adoption of the 1934 one-wear solid wrought-steel wheel specification the Wrought Steel Wheel Manufacturers Technical Committee has conferred with your committee and requested certain modifications in the specifications in order to facilitate production, and at the same time maintain the price of the one-wear solid wrought steel wheel on an attractive basis.

After consideration and following joint sessions with the manufacturers' representatives, your committee recommends the following specification revisions:

[These revisions comprehend a change in the carbon range from the present 0.67 to 0.82 per cent, to 0.65 to 0.85 per cent; an increase from 1/16 in. to 3/32 in. in the tolerance under the specified thickness of flange; the inclusion of the letters "A. A. R." in the identification marking; mating by ½-tape sizes, and revisions in manual references to bring the manual and specifications into conformity.—EDITOR.]

Mating Wheels to Closer Diameters

The committee recognizes and wishes to emphasize the importance in wheel service of mounting wheels to closer diameters as expressed in tape sizes. This matter has been discussed with the Chilled Iron Wheel Manufacturers with respect to marking wheels in one-half tape sizes. The manufacturers have agreed to this practice and will white-stencil tape sizes on wheels conforming to the following arrangement:

	White Stencil
Tape 2	20
Tape 2½	25
Tape 3	30
Tape 3½	35
Tape 4	40 etc.

In addition to the white stenciling in recognizing one-half tape sizes, the tape-size nibs cast on the wheels will be cut according to the tape size representing the left-hand figure of the stenciled tape size; for instance, stencil tapes 20 and 25, chip all but 2 nibs; stencil tapes 30 and 35, chip all but 3 nibs, etc.

The question of taping and pairing wheels to one-half tape sizes was discussed with representatives of the Wrought Steel Wheel Manufacturers as well as the Cast Steel Wheel Manufacturers, and the manufacturers were agreeable to adopting this practice. The one-half tape sizes will be indicated by the figure "5" following the full tape size; 157½ tape will be indicated by 157-5, 158½ tape, 158-5, etc.

In the revisions recommended for the one-wear wrought-steel wheel specification, mating wheels to one-half tape sizes will be included. This revision in the multiple-wear wrought-steel wheel specification and the cast-iron wheel specification can be taken care of when these specifications require revision on account of more extensive changes.

The standard wheel tape is not graduated in one-half tape sizes, but it is the opinion of the committee there will be no dif-

ficulty in interpolating one-half tape sizes in the process of taping the wheels, and that good results will attend the necessary effort that will be expended in thus endeavoring to get the wheels mounted to closer diameters.

Cast-Steel Wheels

Two prominent cast-steel manufacturers have furnished a limited number of multiple-wear cast-steel wheels. Some of these multiple-wear wheels have been placed in exacting locomotive tender service and the committee earnestly solicits from the roads observing the performance of these wheels the results of service developments.

These same manufacturers are also in position to supply one-wear cast-steel wheels, the wheels to conform to the same design and specified dimensions as outlined in the specification for one-wear wrought-steel wheels adopted in 1934.

Thermal Checking

Reference has been made in previous reports to the thermal checking of wrought-steel wheels and failures that result from this development. This subject was given prominent place in the discussions with the manufacturers' representatives. It is the opinion of your committee that while thermal checking may originate from a thermal condition developed in braking, the further development from such surface checking is not as liable to produce a wheel failure if the wheels have been relieved of internal stresses set up in the process of manufacture.

The manufacturers in recognition of the serious developments that may obtain from thermal cracks are actively engaged in developing methods for relieving the wheels of the forging stresses after forming, as well as developing special materials that may be less sensitive to the thermal conditions under which the thermal cracks originally develop. It is encouraging to observe that considerable advancement is being made along these two lines.

[The committee reported that it had been engaged in an extensive revision of the Wheel and Axle Manual preparatory to its reprinting, and that it had formulated a proposed list of symbols to apply to axle defects similar in principle to those already in effect for identifying wheel defects.—EDITOR.]

Recommendations

The following is a summary of the committee's recommendations to the Association:

1. Maximum and Minimum Flange Thickness, Height and Throat Radius Gages.—Recommendation is made for the adoption of Maximum and Minimum Flange Thickness, Height and Throat Radius Gages for new multiple-wear wrought-steel wheels and steel tires shown as Figs. 1 and 2 for machine finished wheels, and Figs. 3 and 4 for roll-finished wheels.

2. Symbols for Axle Defects.—It is recommended that the symbols covering axle defects as outlined in this report be submitted for approval.

3. One-Wear Wrought-Steel Wheel Specification.—The suggested revisions in the One-Wear Wrought Steel Wheel Specification as outlined in detail in this report should be submitted for approval. It is also recommended that in order to accommodate the change in the flange thickness tolerance for the one-wear wrought-steel wheel the flange thickness feature of the gage shown in Circular DV-807 as Fig. 5 should be revised to show two dimensions as herein recommended—one dimension to apply to cast-iron and one-wear cast-steel wheels, the other to apply to one-wear wrought-steel wheels.

The report was signed by H. W. Coddington (chairman), chief chemical and test engineer, N. & W.; D. Wood (vice-chairman), engineer tests, So. Pac.; C. T. Ripley, chief mechanical engineer, A. T. & S. F.; O. C. Cromwell, assistant to chief motive power and equipment, B. & O.; E. C. Hardy, general inspector, N. Y. C.; A. M. Johnsen, engineer tests, Pullman Co.; J. Matthes, chief car inspector, Wabash; C. Petran, supervisor tools and machinery, C. M. St. P. & P., and M. R. Reed, general superintendent motive power, central region, Penna.

Discussion

J. McMullen, superintendent, car department of the Erie, complimented the committee on its report, but questioned the recommendation regarding the limited use of the worn-through-chill gage, stating that some gage must be available for use in checking and condemning out-of-round wheels, which are now causing excessive maintenance expense owing to broken brasses, brake beams, etc., as well as damage to lading. L. Richardson, mechanical superintendent, Boston & Maine, supported this contention regarding the need for an eccentric wheel gage. Mr. Coddington explained that the worn-through-chill gage is not designed to detect eccentric wheels or wheels which are out-of-round for any other reason than being worn through chill. Mr. Ripley stated that other factors than out-of-round wheels are frequently responsible for damage to equipment and lading and suggested that it may be cheaper for the railroads to improve spring conditions rather than to place the entire blame on the wheels and develop an eccentric or out-of-round wheel gage which would condemn a substantial percentage of car wheels now in service. He said that he is not opposed to the idea of an eccentric wheel gage, but suggested that its design must be developed with the greatest care in order to avoid a prohibitive cost for wheel renewals.

In connection with the one-wear wrought steel wheels for 6 in. by 11 in. axles referred to in the committee's report, R. L. Kleine, assistant chief of motive power (car) of the Pennsylvania, stated that 4,000 of these wheels have been placed in service on the Pennsylvania in a year and that the specification should be revised to incorporate this design as soon as possible without waiting for a more general use of this type of wheel.

Action.—The report was accepted and necessary recommendations ordered submitted to letter ballot.

Report on Tank Cars

During the year the committee considered a total of 214 dockets and applications for approval of designs, of which 129 covered shipping containers of 12 different classes for application to 1,163 new or existing cars. Two applications covered eight multi-unit cars to be used for the transportation of 15 Class I. C. C. 106-A-500 one-ton containers each. Sixty-seven applications covered alterations to existing equipment, such as applications of insulated dome covers, bottom outlets, steam-heater coils, etc., a total of 1,209 cars of six classes being involved. Fifteen applications for the approval of tank-car appurtenances, such as one-inch angle valves, dome covers, discharge valves, etc., were considered; also one application for proposed specifications for fusion-welded anchor rivet covers.

At a public hearing presided over by the director, Bureau of Service, I. C. C., the committee and others interested presented testimony in support of their recommendation that the 21 proposed fusion-welded shipping containers covered by pending applications be approved for experimental service trials. At this same hearing, specifications were recommended to cover fusion-welded containers mounted on and forming part of a car. To date, the I. C. C. has not indicated their disposition of these recommendations.

As a result of continued unfavorable conditions, the committee has recommended to the Arbitration Committee the extension for a period of one year of the effective date of interchange rules covering head-block anchorage, wooden shims between the center anchorage and the underframe and the method of securing dome covers to tanks by means of a hinge or chain.

A subcommittee on safety valves has continued to give consideration to the development of a safety valve which will overcome the objections to the present standard valve, which develops a slight leakage before reaching the safety-valve setting.

In its last report the committee called attention to the failures of two tank cars used for the transportation of chlorine. Investigations of the causes of these failures have resulted, in one case, to improved manufacturing methods. In the other case, involving a tank with an anchorage of an obsolete design, owners of similar tanks were informed of the potential hazard involved in their continued use in transportation service. The voluntary retirement of some 18 tanks having anchorages of similar design is highly commendable and is indicative of the industry's desire to co-operate in the interest of safety.

Since its last report the committee has caused to be conducted one additional investigation of the failure of a chlorine tank. Report of this investigation indicated the necessity for improved manufacturing methods. The necessary corrective measures have been taken to prevent a recurrence.

The committee recommends for submission to letter ballot modifications in A. A. R. specifications for 16 different classes of tank cars. The committee also recommends for submission to the Arbitration Committee a proposed modification of Interchange Rule 3, Sec. t, Par. 14, covering desired requirements which should be met at the time new tanks are applied and which are not included in the specifications for Class 3 tank cars.

I. C. C. order No. 3666, dated June 18, 1932, contained the following modification of Par. 243 (c) of their Regulations for Transportation by Rail of Explosives and Other Dangerous Articles by Freight: "Effective on and after October 1, 1932, no tank-car manhole closure of screw type with or without vent holes, or of any other design, shall be permitted on any tank car being used in the transportation of any material described in Subparagraph (a) or (b) of this regulation, unless the closure is equipped with approved safeguard making its removal from

manhole opening practically impossible while car interior is subjected to vapor pressure of the lading."

In order that all interested parties may be informed of the owners' compliance with the foregoing requirement, your committee is recommending that the Bureau of Explosives give consideration to a proposed modification of same, to require tank cars so equipped to be distinctively marked.

The report was signed by: G. S. Goodwin (chairman), assistant to general superintendent of motive power, C., R. I. & P.; F. A. Isaacson (vice-chairman), engineer of car construction, A., T. & S. F.; A. G. Trumbull, chief mechanical engineer, C. & O.; G. McCormick, general superintendent of motive power, So. Pac.; W. C. Lindner, chief car inspector, Penna.; A. E. Smith, vice-president, Union Tank Car Co.; G. E. Tiley, assistant traffic manager, General Chemical Co.; C. C. Meadows, master car builder, Tide Water Oil Co.; G. A. Young, head, school of mechanical engineering, Purdue University; F. Zeleny, engineer of tests, C., B. & Q., and W. C. Steffa, transportation manager, Sinclair Refining Co.

Action.—The report was accepted and necessary recommendations referred to letter ballot.

Report of Arbitration Committee

During the year Cases 1737 to 1746, inclusive, have been decided.

Due to various designs of receptacles being applied for accommodation of defect and information cards, and continued recommendations from railroad clubs and car inspectors that same be provided as a safety measure and to facilitate inspection in interchange, a specification outlining minimum requirements in connection with design of such receptacle has been prepared which it is recommended be submitted to letter ballot for adoption as recommended practice.

The committee does not feel the other modifications included in its report necessitate submission to letter ballot, the majority of them being routine and covering changes recommended by the committees on Car Construction, Tank Cars and Couplers and Draft Gears, extensions of effective dates of various requirements and changes necessitated by letter ballot action last year.

No further extension in effective date beyond January 1, 1936, has been recommended for the requirements in Freight Rule 3 providing hand-brake connections on freight equipment cars must be of chain and that hatch covers on refrigerator cars must be secured by hinges, or for the requirement in Passenger Rule 2 covering location of platform safety chains. No requests for extension of these days have been received and it is considered that ample time has elapsed to permit compliance. For the same reason, the requirement in Passenger Rule 2, providing that cars other than passenger-carrying equipment must be equipped with metallic steam heat connectors, has been extended for only three months to January 1, 1936, with recommendation that no further extension be granted.

Numerous reports of accidents and delays occasioned by defective or missing brake hangers, hanger pins and cotters, box and column bolts, etc., and complaints as to failure of car owners to maintain properly these details on their own equipment, continue to be received, notwithstanding the fact that circulars have been issued from time to time calling attention to this condition. Your committee recommends that the items of cotters and small nuts be eliminated from Rule 108 (which prohibits billing for same) and a charge provided sufficient to cover the cost thereof; also, the addition of a new Rule 64 to the Code providing proper method of application of these details, as a safety measure.

Account complaints as to inequity involved in permitting charge on basis of value new for various items of secondhand material when applied to foreign cars, no re-use limits having been established for such items, a joint subcommittee consisting of members of the Arbitration and Car Construction committees of the Mechanical Division and representatives of the Purchases and Stores Division, was appointed to make study to determine the percentage of value new represented in the average secondhand wear life of such details. Your committee has listed twelve items for which it recommends charge on basis of 50 per cent of value new, when applied, secondhand, in repairs account of owner's defects or on authority of defect card. The joint subcommittee is continuing its study, based on wear value for the secondhand parts, and with consideration as to whether additional items should be added to the list.

A number of complaints having been received as to failure of secondhand brake beams applied and charged at the allowance of 65 per cent of value new (permitted under the current rules), many of such beams apparently being but slightly above condemning limits when applied, a joint subcommittee, consisting of members of the Arbitration, Brake and Car Construction committees, was appointed with request that specification be provided which would result in a reclaimed beam of reasonably satisfactory service life expectancy to car owner and eliminate many failures now experienced as result of secondhand brake beam applications. This joint subcommittee has completed its report which will be submitted for letter ballot vote just as soon as approval of the various committees involved can be secured. Your committee has approved this report, subject to review of prices by the Committee on Prices for Labor and Materials and approval of the method of repairs by the Committee on Car Construction. If the specification is approved by letter-ballot action, your committee will immediately formulate the necessary changes suggested for the Interchange Rules.

All recommendations for changes in the Rules of Interchange submitted have been considered and, where approved, changes have been recommended.

Attention is again directed to the fact that the Arbitration Committee will not consider questions under the Rules of Interchange unless submitted in the form of Arbitration Cases as per Rule 123.

Freight Car Rules

RULE 3

The committee recommends that effective dates for various requirements in the present rule as listed below, now set at January 1, 1936, be extended to January 1, 1937:

Section (a), Paragraph (6)—Axles under 70,000 lb. capacity cars.

Section (b), Paragraph (6)—Brake beam hangers with eyes not formed solid.

Section (b), Paragraph (8)—Bottom-rod and brake-beam safety supports.

Section (d), Paragraph (3)—Draft-key retainer.

Section (f), Paragraph (1)—Stake pockets on flat cars.

Section (f), Paragraph (2)—Stake pockets on flat cars.

Section (t), Paragraph (7)—Head block anchorage on tank cars.

Section (t), Paragraph (8)—Wood shims between longitudinal anchorage and underframe, on tank cars.

Section (t), Paragraph (13)—Dome covers secured by hinge or chain, on tank cars.

Also, that the effective date of Paragraph (7) of Section (b) of this rule, having reference to metal badge plate showing dimensions of brake levers standard to car, now set at January 1, 1936, be extended to January 1, 1938.

Reason: The present situation justifies these extensions.

The committee recommends that a new Paragraph (5) be added to Section (a) of this rule, with Paragraphs (5) to (7) renumbered to require the equipping of triple valves cleaned after January 1, 1935, with heavy graduating springs, the former light-weight graduating springs being prohibited.

The committee recommends that a new paragraph and note be added following present Paragraph (2) of Section (t) of this rule, to be designated as Paragraph (3), and modification made in the note following the present Paragraph (2), with the renumbering of the subsequent paragraphs in Section (t), to become effective August 1, 1935, the purpose of which is to restrict the use of T- and L-section designs of cast-steel side frames as recommended by the Car Construction Committee.

The committee recommends that a new Paragraph (16) be added to Section (t) of this rule and included in the next supplement, to read as follows:

Proposed Form—(t) (16) *Tank cars. Effective January 1, 1936, no tank car of Class I construction will be accepted under load. In interchange.*

Reason: As a safety measure. This recommendation has the concurrence of the Committee on Tank Cars and the American Petroleum Institute.

The committee recommends that the first note following Paragraph (1) of Section (u) of this rule be modified, effective August 1, 1935, to include within the exception all cars using the A. A. R. Z-bar type center sill, as well as the 1932 standard steel-sheathed wood-lined box car.

RULE 5

The committee recommends that the extended time limits of second paragraph of this rule, as shown in the 1935 Code, be continued until January 1, 1937.

Reason: Account curtailment in car repairs resulting in holding of bad-order cars under present conditions.

RULE 17

The committee recommends that Paragraphs (1) and (2) of Section (b) of this rule be consolidated as new Paragraph (1), to make clear that the provisions of Paragraph (2) do not apply to other sections of this rule.

The committee recommends that a new last paragraph be

added to Section (i) of this rule, to become effective August 1, 1935, to read as follows:

Proposed Form—Secondhand non-approved friction draft gears may be substituted for gears of obsolete types, providing they are interchangeable as to sill spacing and coupler pocket limits. In case a new non-approved friction draft gear is applied in place of a non-approved or obsolete gear where the sill spacing and coupler pocket limits are such that an approved gear could be applied, charge for gear applied should be confined to secondhand value. In such cases no defect card is required, regardless of whether gear applied is new or secondhand.

Reason: It is felt this substitution should be permitted without penalty.

Rule 18

The committee recommends that second and third sentences of first paragraph of this rule be modified as follows:

Proposed Form—In the application of secondhand D and E couplers complete, *or new coupler bodies of same types,* distance between point of knuckle and guard arm must not exceed 5 in., measured *perpendicularly to guard arm.* In the repair of D and E couplers by the application of knuckle, lock or pin, any or all, *or the application of secondhand coupler body only,* the distance between point of knuckle and guard arm must not exceed 5⅛ in., as measured by gage shown in Figure B on page 47.

Reason: To provide limits for application of secondhand D and E couplers complete or new coupler bodies of same types, as recommended by the Committee on Couplers and Draft Gears.

Rule 19

The committee recommends that the following items be added to this rule, as prohibitive repairs, effective August 1, 1935:

Proposed Form—Brake beams, of capacity less than No. 2.

Triple-valve graduating springs Nos. 1057 or QT 232.

Reason: To stress the importance of prohibiting the use of this material in repairs to foreign cars.

The committee also recommends that the following item be added to this rule, as prohibitive repairs:

Proposed Form—Pressed-steel journal boxes, except when replaced in kind.

Reason: As pressed-steel boxes will be prohibited in interchange in 1938, substitution of same for other types should not be permitted.

Rule 20

The committee recommends that third paragraph of this rule be modified as follows:

Proposed Form—The use of liners between male and female portions of center plates is prohibited where the vertical bearing surfaces are reduced, *except, in cases where side bearing clearance cannot be otherwise adjusted, the use of a one- or two-piece metal shim, not to exceed ⅛ in. in thickness, between the bearing surfaces of the upper and lower center plates, is permissible, providing the vertical bearing surface of the center plate is not reduced below 1⅛ in. No labor or material charge will be permitted for same.*

Reason: In some types of construction the use of shims between center plates is the only practical means of adjusting side bearing clearance. This recommendation has the approval of the Committee on Car Construction.

Rule 32

The committee recommends that the first paragraph of this rule be modified to make clear that the exception is intended to cover only the light sheet-metal closures used to protect tank-car insulation against weather conditions and should not be confused with insulated dome cover which serves as a closure to the tank.

Rule 49

The committee recommended that Section (a) of this rule be modified, to set forth a standard location for the receptacles for defect, information and joint-evidence cards on each type of car, where such receptacles are used. This is a safety measure for car inspectors.

The committee recommends that the following specification for defect card receptacle be submitted to letter ballot for adoption as recommended practice:

Defect Card Receptacle

Recommended Practice

Adopted, 1935

Minimum requirements are as follows:

1. To be of metal, preferably rust-proof.
2. Inside dimensions, ½ in. by 4 in. by 8½ in.
3. To admit of efficient securement to wood or metal.
4. To admit of easy insertion and withdrawal of cards.
5. Outside face to be lettered "DEFECT CARDS."
6. So designed as to protect contents during inclement weather.
7. Cover optional. If designed with cover, however, such cover shall be self-closing and not open as result of vibration, wind or in handling cars over unloading machines.

Rule 60

The committee recommends that last sentence of Section (g) of this rule be modified in the next supplement to the current Code, as follows:

Proposed Form—Effective January 1, 1935, triple valves applied in repairs to *all* cars must be equipped with the heavier type graduating springs (piece Nos. 18286 or QT 369), regardless of type in valve removed, for which no additional charge is permissible.

Reason: To clarify the intent that light weight graduating spring must not be used.

Rule 64

The committee recommends that a new rule be added to the Code, to read as follows:

Proposed Form—Rule 64. No charge shall be made for the application of spring cotters or split keys unless of proper size and legs properly spread.

No charge shall be made for application of separate common nuts unless such nuts are fully tightened, and, where applied to journal-box bolts, column bolts or brake-hanger bolts, such common nuts must be secured with nut lock or lock nut.

Reason: To insure proper application of these details, as a safety measure.

Rule 70

The committee recommends that Sections (b) and (d) of this rule be modified as follows:

Proposed Form—(b) Wrought-steel wheels (multiple wear) may be substituted for cast-steel or steel-tired wheels, and the betterment charge is proper against car owner regardless of responsibility for the repairs.

(d) The substitution of multiple-wear wrought-steel wheels for cast-iron wheels or *one-wear wrought-steel wheels* standard to car does not constitute improper repairs. If such substitution is made, however, account owner's responsibility, the charge is to be based on *A. A. R.* prices, but in no case to exceed *A. A. R.* prices for new cast-iron wheels *or new one-wear wrought-steel wheels* standard to car.

Reason: The one-wear wrought-steel wheel should be protected to the same extent as cast-iron wheels insofar as such substitution is involved.

Rule 83

The committee recommends that first paragraph of this rule be modified as follows:

Proposed Form—The application of cast-iron wheels (regardless of date cast), of nominal weight less than 750 lb., to axles having journals 10 in. long or over, 700 lb., to axles having journals 9 in. long or over and 650 lb., to axles having journals 7 in. long or over, *or cast-iron wheels without any weight cast thereon,* is prohibited.

Reason: To conform with Rule 98.

Rule 88

The committee recommends that fourth paragraph of this rule be modified as follows:

Proposed Form—Wrong wheels as outlined in Rule 70, Section (a), Paragraphs (1) to (5) inclusive. Bills to be rendered in accordance with Interpretation No. 4, Rule 98.

Reason: To provide for all cases where wrong wheels are substituted.

Rule 101

Attention has been directed to the fact that certain railroads continue to order new Type D coupler bodies, contrary to 1933 letter ballot action which authorized the manufacturers to scrap patterns, core boxes and gages covering Type D coupler bodies, in view of the adoption of the Type E as A. A. R. Standard.

Effective January 1, 1936, it is recommended that charge for such new Type D coupler bodies, when applied to foreign freight cars, shall be restricted to secondhand value.

Rule 108

The committee recommends that tenth item under Section (b) of this rule be modified effective August 1, 1935, as follows:

Proposed Form—Seal hook, pin, or chain (any or all), *except where R. & R. or R. of one or more bolts or rivets is involved in the application of same.*

Reason: Charge should be permissible for repairs of this nature when the use of bolts or rivets is involved.

The committee recommends that the following items be elimi-

nated from Section (b) of this rule and a charge provided for same with a minimum sufficient to cover the cost thereof:

Nuts, nut locks and lock nuts (including unit nuts), all types 1⅜ in. or smaller.

Spring cotters or split keys, under all conditions.

Reason: Failure to maintain these details is resulting in accidents and delaying the movement of cars.

RULE 112

The committee recommends that Section (j) of this rule be modified so that auto loading devices will be included among the items which the owner may instruct the handling line to return when he is requested to furnish the settlement value of a car under this rule.

Passenger-Car Rules

RULE 3

The committee recommends that a new last sentence be added to note following Paragraph (a) of this rule, to read as follows:

Proposed Form—Note.—In event line car is set out enroute account mechanical defects and another car substituted, line service expense shall be confined to full line mileage proportion of expense at originating terminal on original line car only. *In such case, where a car is cut out for any reason and another car not substituted to complete the run to destination, the proportion of terminal expense of the originating road should be confined to the point where car was cut out.*

Reason: To clarify the intent.

RULE 4

The committee recommends that a new second paragraph be added to this rule and included in the next supplement, to read as follows:

Proposed Form—Effective January 1, 1937, all steel or steel underframe cars must be equipped with cardboards or suitable receptacle for the accommodation of defect and joint evidence cards. Same should preferably be located on center sill near center of car or other suitable location for visual inspection, same side of car and adjacent to air-brake stenciling. Size of cardboard, if used, shall not be less than 5½ in. by 9 in.

Reason: To provide for application of defect cards and joint evidence cards on passenger cars.

RULE 7

The committee recommends the revision of the second and third sentences of Paragraph (1) of Section (h) of this rule so that it conforms to the changes made in freight-car Rule 18.

Reason: To provide limits for application of secondhand D and E couplers complete or new coupler bodies of same types, as recommended by the Committee on Couplers and Draft Gears.

The committee recommends that note following Section (j) of this rule be modified, to read as follows:

Proposed Form—Note.—When U-12-BC type of U.C. control valve is removed, it should be replaced in kind, or, if replaced by U-12 or U-12-B valve, proper credit must be allowed car owner as outlined in notes following Item 20-C of Passenger Rule 21. In the substitution of the U-12-BC valve, for defective U-12 or U-12-B valve, car owner is not responsible for the betterment of improved cylinder cap having hair strainer, *unless the U-12-BC valve is standard to car as indicated by stenciling.*

Reason: Charge for betterment in such cases is justified.

RULE 8

The committee recommends that Item 4 of Section (a) of this rule be modified, and that a new Item 15 be added to this section, as follows:

Proposed Form—(4) Impact in switching, exceeding damage to couplers and attachments, *draft-gear stops,* buffers and diaphragm face plates or parts thereof.

Reason: To clarify the intent and conform to Decision No. 1599.

Proposed Form—(15) Center sill, one, or more, damaged, except when caused by emergency application of air brakes from engine cab, or due to bursting of air hose, breakage of coupler part, yoke or attachment. In such cases statement must be furnished showing circumstances under which the damage occurred, in order to establish responsibility of car owner for the repairs. Principle of Notes Nos. 1 and 2 under Freight Rule 32 applies.

Reason: Car owner is reasonably entitled to this protection.

The committee also recommends that item of *"release valves"* be added to Section (g) of this rule, covering missing material.

Reason: This item should properly be included with other items of missing material.

The committee made slight modifications in Freight-Car Rule 8 to clarify its intent and in Freight-Car Rules 9 and 14 to conform with changes in other rules. Extension of time limits to January 1, 1937, was also recommended in the first paragraph of Rule 87 and the first paragraph of Rule 94.

The report is signed by W. H. Flynn (chairman), general superintendent motive power and rolling stock, N. Y. C.; C. T. Ripley (vice-chairman), chief mechanical engineer, A. T. & S. F.; T. W. Demarest, general superintendent motive power, Penna.; T. Beaghen, Jr., superintendent car maintenance, Mexican Petroleum Corp.; J. J. Hennessey, assistant superintendent car department, C. M. St. P. & P.; L. Richardson, mechanical assistant to vice-president and general manager, B. & M.; G. E. McCoy, assistant general superintendent car equipment, Can. Nat., and M. F. Covert, general superintendent equipment, General American Car Co.

Action.—The report was accepted and referred to letter ballot.

Report on Loading Rules

As the result of meetings held with shippers and investigators conducted during the past year, the committee recommended changes in the Loading Rules as hereafter outlined.

RULE 8

Idlers to Protect Overhanging Loads.—Change Section F to read as follows:

When one car serves as an idler between two overhanging loads the space on idler between the projecting ends of loads may be utilized for loading, but exacting care must be taken to secure such lading so that it will clear the overhanging loads at least 2 ft. *between ends of such ladings.*

Reason—to clarify the intent.

RULE 12

Weight on Bearing Pieces—Change to read as follows:

They must be of sound straight grained lumber (hardwood preferred), and may, if over 5 in. high, be of built-up lumber in the form of cribbing of ample strength. Rolled or built-up sections of steel of suitable strength may be substituted. The width of the base must be at least equal to the height, except when otherwise specified, and the length must not be less than the width of the car. *For single overhanging load, weighing 25,000 lb. or less on floor of all-steel or steel-underframe car, bearing pieces extending 1 ft. beyond each side of lading may be used.* The height must be sufficient to keep the lading at least 4 in. from the floor or end gates of idler car. If necessary to provide such clearance, hardwood blocks, of suitable dimensions may be spiked to floor underneath and at right angles to 12-in. by 12-in. bearing pieces, one at each end and one at center, which must project at least 18 in. from sides of bearing pieces. For structural and similar material, the bearing piece must be secured to car floor. Placing them between bolster and end of car is prohibited in connection with all loading, except when otherwise specified. When only one is used per car, it must be located at least 12 in. from center line of bolster towards center of car, except when otherwise specified.

Reason—To economize for shippers.

RULE 16

Loads on One Car Overhanging One or Both Ends—Width, Height and Length.—Change to read as follows:

The following table shall govern in deciding the maximum width, according to *length* of overhanging loads on single cars. The total length of lading must not exceed the limits in Rule 17. For intermediate lengths of cars not listed in this table the maximum length and width of overhanging load as shown for the next longer car shall govern.

The overhang is measured from center of truck to extreme end of overhang. For loads over 12 ft. high subtract 2 in. from given width of load for each inch of height in excess of 12 ft.

Reason—Correction.

RULE 18

Change to read as follows:

Load on Two or Three Cars—Width, Height, Overhang, Coupler Spacing Blocks and Uncoupling Mechanism.

(a) Coupler spacing blocks *must be applied per Fig. 3. Uncoupling mechanism must be made inoperative per Fig. 4.*

(b) The width of load, distance between bearing-pieces, and length of overhang must not exceed the dimensions *shown in the following tables* for loads 12 ft. high *or less,* measured from top of rail to top of load. For loads over 12 ft. high *from top of rail to top of load, the given width must be reduced 2 in.* for each inch in height *for that portion of load* in excess of 12 ft.

(c) When cars of different lengths are used for the same load, the maximum width of load shall be as shown in the tables for longest *carrying* car used.

(d) For cars of intermediate lengths not shown in the tables,

the maximum width of loads on carrying cars must be governed by the next longer car shown in the tables.

Reason—To clarify the rule.

RULE 19

Machines of Pivoted or Swinging Type—Inspection and Placards.—The Committee on Loading Rules recommended including a clause in Interchange Rule 36, something like the following:

Inspection Certificates.—Used by carriers in accordance with the loading rules to indicate that loads of rotating machines have been properly inspected before being accepted from shippers. Defect card, covering application to loaded cars or removal from empty cars, in interchange, shall be furnished and charges made in accordance with Rule 107.

Reason—To enforce special care in connection with the loading of such dangerous machinery.

Change Rule 19 to read as follows:

Machinery, *Rotary* or Swinging Type—Inspection and *Carding.*—Machinery (including covered machinery), of this type, such as cranes, derricks, steam shovels, mining, etc., *due to extraordinary hazards in transporting, whether loaded on cars* or moving on its own wheels, *the rotating or swinging portions, including booms, extensions, etc., must be secured in accordance with A. A. R. Loading Rules. This security must be certified to by an authorized inspector who shall fill out two cards (illustration omitted), and attach one card to each side of machine moving on its wheels, or to each side of car upon which machine is loaded.*

PREFACE—Change to read as follows:

These rules have been formulated for the purpose of providing uniform, safe and economical methods of loading in open-top cars.

In the loading of such cars the hazards connected with high-speed multiple-track railroads, tunnels, electrical conductors, and the necessity of protecting human life and property should be borne in mind.

While these rules are based on many years of exacting studies and experiments, the railroads stand ready at all times to co-operate with the shippers for betterments. Suggestions made to the Secretary, Mechanical Division, Association of American Railroads, 59 E. Van Buren Street, Chicago, Illinois, will be given prompt attention.

The loading of freight for which no definite rules have been provided should conform as nearly as possible to the best example that can be deduced from this code.

Reason—To improve the wording. (Defer until complete code is reprinted.)

Instructions—Experimental Load Cards—Change to read as follows:

Shippers *desiring to deviate from these rules must* procure authority from the Secretary, Mechanical Division, *Association of American Railroads,* or the Chairman, Committee on Loading Rules. *Association of American Railroads,* to make *such* experimental shipments.

Twelve drawings must accompany requests for authority, together with the names of the railroads serving the shipper.

The cards, Fig. 1, properly filled in, must be attached to both sides of car by shipper. Only one car need be so carded in connection with twin or triple loads.

Loads disarranged in transit should be replaced as originally loaded, if possible, or in accordance with current rules. Report made to the Secretary, Mechanical Division, *Association of American Railroads* showing reasons for adjustment, *should contain sufficient information to enable the Committee on Loading Rules to decide as to the cause of failure.* In such cases the cards must be left on car.

All cards *must be* removed from cars at destination *and* be sent to the Secretary, Mechanical Division, *Association of American Railroads,* by the railroads last handling the shipments, describing exact conditions of load at destination.

Reason—To clarify the intent.

FIG. 6

Change last paragraph to read:

Lumber less than 12 ft. long must not be loaded in flat or gondola cars, except *as follows:* If not less than *10 ft. long, place inside of solid wall of lading 12 ft. long or over.* Lumber of any length less than 12 ft. may be loaded *between piles less than 12 ft. apart, provided space is fully covered on each side with boards not less than 1 inch thick, long enough to extend to at least 12 in. beyond inside ends of both piles and nailed to inside of stakes. Lengths less than 12 ft. must be loaded at least 6 in. below top of gondola car sides or side walls. Use two pairs of stakes when space between piles is 8 ft. or less and three pair for space over 8 ft.* Place strip between ends of end piles and car floor to incline piles toward center of car.

Reason—To clarify intent.

FIG. 35

Change fifth paragraph to read:

Material less than 12 ft. long loaded on flat cars must have end and side protection consisting of boards 2 in. thick nailed to inside of items (B) and (C), or use two clamps per pile, Items E, F, G and H. Stakes must be spaced not more than 6 ft. apart. *When of mixed lengths 12 ft. long or over, place longest pieces outside of load to prevent projections over car sides.*

Reason—Better loading.

FIG. 36

Change Items (C) and (D) under No. of Pcs. to read:

(C)—*Load 12 in. high or less above car sides: 1 ea. pr. stakes. Load over 12 in. high above car sides:* 2 ea. pr. stakes.

(D)—*Load 12 in. high or less above car sides: 1 pr. ea. pr. stakes. Load over 12 in. high above car sides:* 2 pr. ea. pr. stakes.

Reason—To economize for shippers.

FIG. 39

Change Item (B) to read:

4-in. by 4-in. hardwood, length to suit, for each 9,000 lb. of lading; placed in stake pockets or bolted to car side with two bolts, ¾ in. dia. *Not required when weight of pile (1 per car side) does not exceed 9,000 lb.*

Change Item (E) to read:

6-in. by 8-in. hardwood, against edge of plates, secured with two bolts ¾ in. dia., with washers, through floor; or use Item (F). *If thickness of pile does not exceed 3 in. hardwood blocks 4 in. by 4 in. by 24 in. secured to top of side angle with not less than two bolts ¾ in. dia., and washers, may be substituted for Items (E) or (F).*

Reason—To economize for shippers.

FIG. 43

Change to read:

MINIMUM REQUIREMENTS FOR SECURING FLAT PLATES —GONDOLA CARS

Item	No. of Pcs.	Description
A		Brake wheel clearance. See Fig. 2.
B	2	6-in. by 8-in., length equal to width of car. Place above each cross-bearer *when necessary to overlap flexible plates at centers.* On all wooden cars only.
C	2	3 in. thick, height of load, length equal to width of car. *On cars of all wooden ends or end gates.* *Plates loaded lengthwise or crosswise leaving a space in excess of 9 in. between sides or ends of plates and each side of car, must be braced to prevent side shifting; except for narrow plates loaded crosswise when the ends of piles are placed alternately against car sides.* *Plates loaded lengthwise which are too wide to place two piles in car, must be placed against each side of car and lapped at center.* *Reasonable space between piles and sides of car for removal of hooks, chains, etc., is permissible.*

See General Rules for further details.

Reason—To clarify the intent.

FIG. 45

Change to read as follows:

Heading: *Minimum Requirements for Securing Girders, Vertically-Flat or Gondola Cars.*

New Paragraph:

For gondola loading, substitute in lieu of Items (B), (C), (N) and (O); four pieces, 2-in. by 8-in. hardwood laterally between bottom flange of outside girder and car side near each Item (D), nailed to floor. Also, four pieces, 2-in. by 8-in. hardwood laterally between web of outside girder and car sides, nailed to top side of the above mentioned pieces. All other bracing to be same as for flat cars.

Reason—To provide for loading in gondola cars, thereby, economizing for the shipper.

FIG. 52

Change Item (F) to read:

4-in. by 6-in. hardwood, load over 2 ft. to 5 ft. Not required when load is 2 ft. high or less, or when width of material exceeds 2 ft., except when height of load is greater than the width of the individual pile in the load. *When Item (F) cannot be effectively applied on loads, the height of which is less than car side, blocking sufficient to fill space between lading and car sides*

must be applied and secured to avoid displacements.
Reason—To improve the loading.

FIG. 57

Change Item (C) to read:
Two or four—6-in. by 8-in. hardwood. *Place one at center of each of Items (B)* for loads exceeding 10,000 lb., per bearing piece (Item B) and less than one-half the allowable weight of the load. *Place two over center sills at each Items (B)* for loads exceeding one-half the allowable weight *of load.* Place 2-in. by 10-in. by 30-in. hardwood pieces between Items (C) and car floor, nailed to prevent shifting.
Reason—To clarify the intent.

NEW FIG. 63-A

Drawing and specifications* attached
Reason—To provide an alternate to Fig. 63 by request of shippers.

NEW FIG. 71

Drawing and specifications attached.
Reason—To provide for securing of bundled sheet steel, oiled or plain, with high-tension bands or wire, in gondola cars.

PROPOSED FIG. 71

MINIMUM REQUIREMENTS FOR SECURING OILED OR PLAIN SHEET STEEL IN BUNDLES WITH METAL BANDS OR WIRE WHEN LOADED LENGTHWISE IN GONDOLA CARS

[Report contained Fig. 71 showing methods to be used in loading steel sheets in banded bundles; also tabulated instruction data.—EDITOR.]

FIG. 157

Change Item "C" to read:
1¼-in. rods, length to suit, or anchors equivalent in strength. Parts to which anchors are secured must be equally as strong as the anchors. *Rods with hooked ends must not be used.*
Reason—To provide greater safety.

FIG. 159

Change Item "E" to read:
1¼-in. rods with nuts and washers, threads riveted over, or nuts secured with lock nuts or nut locks, for machines weighing up to 150,000 lb. For machines weighing more than 150,000 lb. 1½-in. rod or equivalent must be used.
Nuts secured in same manner as above
Anchors must be attached to extreme front and rear of rotating portion. If construction of machine will not permit application to extreme rear, they must be placed as close to rear as construction will permit. *Rods with hooked ends must not be used.*
Reason—To provide greater safety.

The report was signed by Samuel Lynn (chairman), superintendent rolling stock, P. & L. E.; E. J. Robertson (vice-chairman), superintendent car department, M. St. P. & S. S. M.; R. H. Dyer, general car inspector, N. & W.; G. R. Lovejoy, master mechanic, Det. Term. Ry.; T. O. Sechrist, assistant superintendent machinery, L. & N.; C. J. Nelson, superintendent of interchange, Chicago Car Interchange Bureau; H. S. Keppelman, superintendent car department, Reading; W. B. Moir, chief car inspector, Penna., and J. A. Deppe, assistant superintendent car department, C. M. St. P. & P.
Action.—The report was accepted and recommendations referred to letter ballot.

Report on Couplers and Draft Gears

Certificates of approval have been awarded covering two additional types of draft gears during the past year. The total number of types approved to date is nine, all of which are listed in the Code of Interchange rules issued under date of January 1, 1935, and Supplement No. 1 issued in March, 1935.

The A.A.R. draft-gear testing laboratory at Purdue University has been engaged also in making periodic check tests of non-harmonic springs and special trucks. This work is being performed for the car construction sub-committee in connection with service endurance tests of these devices. When not required for A.A.R. work the laboratory has been kept busy on commercial testing of draft gears, springs and other devices for various manufacturers.

Reduction in Weight of Draft Gears

In an effort to ascertain what might be done to reduce the weight of existing draft gears, the sub-committee discussed this subject with representatives of the manufacturers at a meeting held in Pittsburgh on January 16. [The committee here summarized the main point brought out in this discussion and called attention to the fact that present certified draft gears already employ high-tensile steel designed to obtain the greatest possible value from each pound of metal. It expressed the opinion that no further substantial reduction in weight can be made except at the sacrifice of existing standards of efficiency which should not be impaired.—Editor.]

Obsolete Gears—Standard Draft Gear

As proposed in last year's report, the list of non-approved draft gears formerly shown under Interchange Rule 101, Section II, has been subdivided and those which could be definitely classed as obsolete have been placed in this category under Section III. There are many gears still listed under Section II which, in the opinion of the sub-committee, should be listed under Section III, but it is hoped that the situation can be remedied during the coming year by agreement of all concerned.

It has been suggested that consideration be given to the desirability and practicability of adopting a single standard A. A. R. draft gear for freight cars. There are wide differences of opinion on this subject. Some of the objections that are cited are reminiscent of the objections offered originally to the adoption of a standard coupler. On the other hand it is pointed out that the railroads have already attained by means of the present standard specifications and the certification of approved gears many of the advantages of standardization.

Regardless of the relative advantages and disadvantages of a standard gear, it will probably be agreed by all that a comprehensive series of tests, including car impact and road tests, would be necessary before a single standard could be agreed upon. The cost of such tests would be considerable. The sub-committee has no recommendations to submit at this time.

This part of the report was signed by H. W. Faus, Chairman, H. W. Coddington, H. I. Garcelon, L. H. Schlatter, W. Bohnstengel, Sub-Committee on Draft Gears.

Gaging and Interchangeability of Type E Coupler and Component Parts

Since the last meeting of the Association the coupler manufacturers have checked their respective Type E coupler products for conformity with standard gages and interchangeability with products of other manufacturers.

One coupler fitted complete for rotary operation, one swivel-butt casting with swivel pin and one vertical-plane swivel yoke were submitted by each of the seven coupler manufacturers, one company submitting two sets of specimens representing the products of two separate foundries. In general, the results were quite satisfactory. There were, however, a number of instances in which the requirements of the various gages and fitting conditions were not met in an entirely satisfactory manner; to these the attention of the manufacturers concerned was directed for correction. Your committee has on file a detailed record of the results of this inspection.

Coupler Reclamation—Welding of Knuckle Tail Back Wall

Considerable attention is being given to the welding of knuckle-tail back wall in coupler bars. This repair operation had been more or less neglected until handling lines began to make these repairs. Under existing rules such bars are classified as scrap, but after being welded, are restored to second-hand value. This reclamation practice on the part of handling lines proves quite profitable, and owners are now giving particular attention to the repair of owned couplers. It has been observed that some of these welded knuckle-tail back walls are failing in the same section, which leads to the opinion that the roads making the repairs are not following the prescribed practice of thoroughly normalizing the bar after the welding operation. Unless such bars are repaired in accordance with A. A. R. recognized practice they should not be billed as second-hand value when placed on a foreign car. It is recommended that couplers welded in the knuckle-tail back wall section have the road initials, shop symbol and date stencilled over the welded section with ⅜ in. steel stencil; the stenciling to indicate that the work has been performed in accordance with A. A. R. practice.

Specification M-201-34 Covering Carbon Steel Castings

Included in the specifications submitted for approval of the members in letter ballot Circular D. V.-824, dated January 7, 1935, was Spec. M-201-34 covering carbon-steel castings. The scope of this specification included coupler and coupler parts. Since the material used in couplers and coupler parts is of a special composition and requires observance of certain treatments and foundry practices which is not required with the ordinary run of steel castings, it is the recommendation of the Coupler

* Specifications omitted in this abstract.

Committee that reference to couplers and coupler parts be removed from Spec. M-201-34 and the specification for coupler materials and parts remain as now published in the Manual of Standard and Recommended Practice.

Lightening the Weight of Type E Coupler

In connection with the study that has been in progress during the past year relating to lightening the weight of car equipment, this committee was called upon to determine what might be accomplished in weight reduction with respect to the Type E coupler. The subject was presented to the coupler manufacturers who, through their Mechanical Committee, made a very careful study of it. It was realized from the first that what reduction in weight might be accomplished must be obtained through a reduction in section dimensions as the result of using a grade of steel superior in physical properties to Grade B Steel. The minimum physical properties tentatively suggested corresponded to the following: Tensile strength, 90,000 lb. per sq. in.; yield point, 60,000 lb. per sq. in.; Elongation in 2 in., 22 per cent; reduction of area, 40 per cent.

The several heats of steel represented by the couplers and yokes subjected to these preliminary tests, satisfactorily met the above physical properties.

In the accompanying tabulation the approximate weights of the reduced-weight couplers and yokes are shown in comparison with the present normal weights for standard Grade B steel couplers and yokes.

Approximate Weights of Couplers and Yokes

	Grade B steel present normal weights	Reduced weight approximate normal
Coupler body, rigid shank	312	235
Coupler body, swivel shank	312	235
Knuckle	99	76
Other fittings (Top or Rotary Operation)	34	34
Swivel butt casting	76	64
Swivel pin	11.5	11.5
Complete coupler, rigid shank	445	345
Complete coupler, swivel shank (without butt and pin)	445	345
Complete coupler, swivel, shank (with butt and pin)	533	421
Vertical plane (horiz. key) yoke	207	150
Vertical plane swivel yoke	217	155

The above weights for the reduced-weight couplers and yokes are based on a very limited number of castings produced, and will require adjustment later to complete the correct range of weights.

These changes in design have been made in a manner to preserve interchangeability with existing standard E couplers, coupler fittings and yokes. The present standard gages will be used for gaging the reduced-weight coupler, coupler parts and yokes.

The coupler manufacturers estimate the reductions in weight of approximately 100 lb. in the coupler assembly, and 60 lb. in the yoke will increase the cost of these parts approximately 20 to 25 per cent. The increase in cost is attributed to the care that will have to be exercised in the foundry practice in order to obtain satisfactory castings with the reduced sections, as well as the most costly constituents that will be required in the high-tensile steel in order to meet the desired physical properties.

[The report gives a detailed record of the tests made on reduced-weight couplers and parts together with those on the standard Type E coupler of Grade B steel also illustrations of the arrangements used in conducting the tests and location of readings taken. Tests were highly satisfactory for the reduced-weight coupler.—EDITOR.]

Continued Use of Type D Coupler Bodies

Action by letter ballot in 1933 authorized the coupler manufacturers to dispose of their patterns, core boxes and gages covering Type D coupler bodies. It has been brought to the committee's attention that some railroads are still insisting upon the manufacturers supplying the Type D coupler bodies. The Type E coupler was adopted because of its superiority in design and strength. The Coupler Committee finds it necessary in order to protect in interchange the interest of the large majority of roads conforming to the use of the A. A. R. standard Type E coupler to recommend to the Arbitration Committee that Rule 101 be revised so that after January 1, 1936, a new Type D coupler cannot be applied to a foreign car at other than second-hand value.

Tightening Coupler Contour Lines to Reduce Slack

During the year L. K. Sillcox, chairman of the Federal Coordinator's Mechanical Advisory Committee, referred to the coupler committee a suggestion from The Symington Company to tighten the contour lines of couplers from 43/64 in. to 1/4 in., and thereby reduce unresisted slack in trains. This suggestion of The Symington Company was accompanied by sketches indicating the impracticability of considering the tightening of coupler contour lines unless certain changes were made in car construction to accommodate additional vertical and horizontal angling. A sub-committee was appointed to study this suggestion and confer with the coupler manufacturers mechanical committee.

After careful consideration of this subject your committee is of the opinion:

1.—That appreciable and effective reduction in unrestricted slack will be realized through the application of certified draft gears and the reduction of unresisted slack through compliance with the draft-gear maintenance program that was established the first of this year.

2.—That the application of Type AB brakes, while not affecting the amount of slack in couplers and draft gears, will provide a system of braking that will render less disturbing unresisted slack in the train.

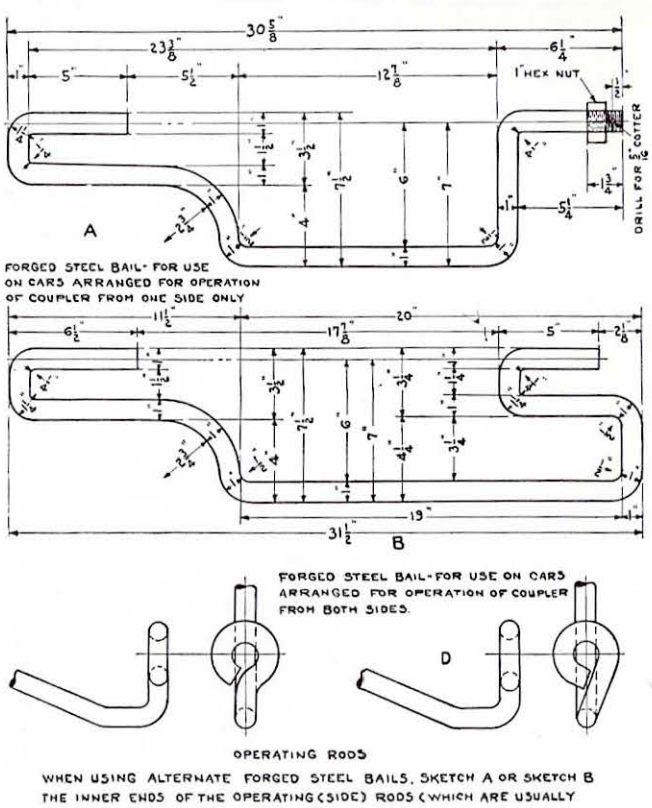
3.—That the means for providing vertical angling by employing a yielding coupler carrier is not a practical and safe arrangement.

4.—That the means suggested for the reduction of 7/16 in. unresisted slack per car by tightening the coupler contour lines over the present standard 10-A contour line is not justified because of the extensive changes that would have to be made in the present car construction, coupler and attachment designs.

5.—That tightening the contour lines as a means of reducing unresisted slack is the most difficult and expensive method of accomplishing such a result, because of the extensive construction changes that necessarily accompany the change in contour. There is still the question of coupler operation, effect on train operation, interchange or interference with existing equipment to be established if the contour lines are tightened. It is the opinion of your committee that in view of the conditions stated above there is no justification for giving further serious thought to accomplishing a reduction of 7/16 in. in unresisted slack per car through the means of tightening present coupler contour lines.

Standardization of Coupler Shank Bushings

In an effort to reduce to a minimum the variety of coupler-shank bushings that are required where swivel pins are used, the coupler manufacturers have made a careful study of the situation and recommend to the coupler committee standardiz-


A
FORGED STEEL BAIL FOR USE ON CARS ARRANGED FOR OPERATION OF COUPLER FROM ONE SIDE ONLY
B
FORGED STEEL BAIL FOR USE ON CARS ARRANGED FOR OPERATION OF COUPLER FROM BOTH SIDES.
D
OPERATING RODS
WHEN USING ALTERNATE FORGED STEEL BAILS, SKETCH A OR SKETCH B THE INNER ENDS OF THE OPERATING (SIDE) RODS (WHICH ARE USUALLY FORMED AS IN SKETCH C) SHOULD BE REFORMED AS SHOWN IN SKETCH D.

Forged-Steel Rotary Lock—Lifter Rails, Type 2, for A.A.R. Standard Type E Coupler Uncoupling Mechanism for Passenger Equipment

ing coupler shank bushing dimensions. Your committee has concurred in this recommendation, and a table of bushing dimensions (not included here) should be included in the Manual of Standard and Recommended Practice.

Forged-Steel Rotary Lock-Lifter Bail, Type 2

The association adopted as recommended practice, effective March 1, 1932, the No. 2 type of uncoupling mechanism for Type E couplers applied to passenger equipment cars. This equipment, as adopted, provided for a malleable-iron lifter bail and lifter link, and was recommended for use in applying Type E couplers to new and existing cars. The coupler manufacturers Mechanical Committee has been studying this subject and has designed two forged-steel bails that may be used as an alternate for the malleable-iron bail. These bails are shown in Fig. 33.

Design A is for use on cars arranged for operation of coupler from one side only. Design B is arranged for operation of coupler from both sides. Design C shows the present form of eyes for the coupler operating side rods as recommended for use with malleab.e iron bail. Design D shows the recommended form of eyes for the side rods when used with either of the forged-steel bails, A or B.

As it may be necessary to replace the malleable-iron bails with wrought-steel bails and operating rods, it is recommended that the designs shown in Fig. 3 be included in the Manual of Standard and Recommended Practice.

The report was signed by: R. L. Kleine (chairman), assistant chief motive power, Pennsylvania; H. W. Coddington (vice-chairman), engineer of tests, N. & W.; C. P. Van Gundy, engineer of tests, B. & O.; C. J. Scudder, superintendent motive power and equipment, D., L. & W.; Samuel Lynn, superintendent rolling stock, P. & L. E.; L. P. Michael, chief mechanical engineer, C. & N. W., and C. T. Ripley, chief mechanical engineer, A., T. & S. F.

Action.—The report was accepted and the recommendations submitted to letter ballot.

Report on Lubrication of Cars and Locomotives

In connection with the recommendation that tests be conducted of various methods and devices for lubricating car journals to develop a method more satisfactory than the conventional waste lubricating practice, the General Committee instructed the Committee on Lubrication "to prepare a plan of procedure with estimate of cost and submit to the General Committee for authority to proceed."

The plan was prepared at a meeting held November 23, 1934, and submitted to the General Committee. The General Committee took the following action at a meeting December 6, 1934: "It was the opinion that the recommendation of the Committee on Lubrication of Cars and Locomotives for tests of various lubricating devices did not cover a large enough scope and did not include sufficient portions of the country to provide conclusive results. It was therefore decided that, instead of approving an appropriation for the tests as recommended by the lubrication committee, the members of the General Committee will carefully review these recommendations and develop what tests along these lines they would be willing to make and under what conditions—the tests to be made under the direction of the test departments of the member railroads and report submitted to the lubrication committee for review and analysis."

Partial reports from members of General Committee were received from the secretary under date of May 2, 1935. Where tests are in progress results remain in abeyance pending further developments.

The chairman of this committee has continued to investigate and test a number of lubricating devices and methods with generally satisfactory results. These tests will be continued and complete report made when definite conclusions are reached.

Journal Bearings

The new design of journal bearing developed by National Bearing Metals Corporation has been tested on a number of railroads and will be given further service tests before being recommended for adoption as an alternate A. A. R. standard.

A recommendation has been made to the Committee on Specifications for Materials of a specification for blending or cutback oil.

This committee is of the opinion that there is no necessity for present Par. 7 of Specification for Reclaimed Car Oil.

The report was signed by G. W. Ditmore (chairman) master car builder, D. & H.; P. Maddox, superintendent of car department, C. & O.; G. C. Hirsch, mechanical inspector, N. Y. C.; E. Von Bergen, general air-brake, lubrication and car-heating engineer, I. C. system; E. G. Cromwell, lubricating supervisor, B. & O., and H. P. Allstrand, principal assistant superintendent of motive power and machinery, C. & N. W.

Action.—The report was accepted.

Prices for Labor and Materials

In order that the rules may currently provide an equitable basis for inter-road billing, your committee has continued the work of analyzing material, labor and new equipment costs in A. A. R. Interchange Rules 101, 107, 111 and 112 of the Freight Car Code, and Rules 21 and 22 of the Passenger Car Code, with a view of determining and recommending necessary changes to be made in the next supplement to the current Code.

Rule 101

All miscellaneous material prices in Rule 101 were rechecked as of March 1, 1935, quotations from purchasing agents of the 10 selected railroads, representing 39 per cent of total freight-car ownership in the United States and Canada, indicating little change in material markets as shown by detail recommendations for revision under this rule.

Items 116 to 134-A Inclusive.—In order to provide a more equitable method of charging for coupler parts, all applied labor has been eliminated from the material prices for such details and coupler-body prices modified accordingly, new labor items being incorporated in Rule 107 to cover.

Items 124-A and 125-A are modified to provide charge for former standard coupler bodies, either new or secondhand, on basis of secondhand value, to penalize the use of new former standard couplers in repairs to foreign cars. Items 124 and 125 are accordingly eliminated, so that change in body prices will not conflict with complete coupler allowances as provided in Rule 104.

Items 188 and 189 have been consolidated as new Item 188, at an average price, to eliminate difficulty in determination of correct price to apply under the former arrangement.

First note under Item 203 has been modified to provide a more equitable method of charging for the 5½-in. by 11-in. non-AAR Standard axle.

Several modifications in prices in Section II of the table for friction draft gears are recommended and one new item added. A new note is added to this section to provide that gears not listed in Sections I or II of the table shall be considered as obsolete types, in order to eliminate controversies as to proper credit where defective gears of obsolete types other than those mentioned in the table are removed. One type of gear has been transferred from Section II to the obsolete classification and five additional types (not previously mentioned) have been added to the obsolete list.

The seventh and eighth items in the table of weights for miscellaneous items have been modified to provide a more equitable method of charging.

A new table of weights for K and H types of air-brake parts is recommended, to provide basis for scrap credit allowance and eliminate controversies in regard to same.

Rule 107

Items 51-A and 51-B have been added to this rule, to provide separate labor charge for application of coupler parts. A new section is added to Item 99 to permit jacking, if necessary, in connection with repairs or renewal of dead lever guide brackets secured by rivets or renewal of its rivets only.

Items 109 and 136 are modified to provide charge for renailing slats and for plastic paper used as roof binder. Item 113 is modified to permit charge for application of insulation to refrigerator cars in connection with renewal of braces.

Item 248 is eliminated, account covered by Item 249.

Items 270 and 271 are modified to eliminate overlap labor when turning steel wheels which are not dismounted. First note following Item 270 is also modified to harmonize with change in Interpretation No. 2 to Rule 98. Items 231 and 296 are modified to clarify the intent.

Account confliction in truck combination labor charges, Items 317 to 328, inclusive, have been entirely revised and additional combinations added, this study also developing modifications necessary in allowances specified opposite Items 14 and 254.

Rule 111

No modifications are recommended in this rule.

Rule 112

For the first time since 1931 a sufficient number of new cars

have been constructed upon which to base a recommendation for revision of reproduction pound prices for freight-train cars, so that supplement effective August 1, 1935, may reflect 1934 costs in lieu of figures shown in the present Code.

As Classes I and II tank cars have not been built since May, 1917, your committee has separated these classes from Classes III, 103, 103-A and 203 and recommends new reproduction pound prices for the latter on basis of 1934 actual costs, and that present per pound settlement prices for the Classes I and II cars be increased by the same percentage as obtains for the all-steel hopper car, which, it is felt, will provide a more equitable settlement basis.

The Class 203 tank car, insulated, with heater pipes, is similar in construction to the Class III insulated car with heater pipes and has been placed in the same group for settlement on reproduction cost basis.

PASSENGER CAR RULE 21

Items 14, 14-A and 20-I are modified to clarify the intent.

New Item 20-K is added to provide allowance for cleaning and oiling slack adjuster.

Item 25-B is modified to harmonize with new fourth note added to Item 270 of Freight Rule 107. Third note following Item 26 is modified to harmonize with change in Interpretation No. 2 to Freight Rule 98.

PASSENGER CAR RULE 22

Changes in material prices in a number of items under this rule are recommended, based on quotations as of March 1 from the purchasing agents of 10 representative railroads.

Items 12-A and 12-B are eliminated account combined with Items 11 and 12.

New Item 14-A is added to provide uniform charge for electric current used in charging storage batteries.

Item 17 and note following Item 54 have been modified to clarify the intent.

It is the intent of the committee to investigate labor and material costs again in October and if sufficient change develops, necessary revision will be made and inserted in the Rules effective January 1, 1936.

The changes recommended in the existing rules were included in detail as a part of the report.

The report was signed by: A. E. Calkins (chairman), superintendent of equipment, N. Y. C.; H. H. Harvey, (vice-chairman), general car foreman, C., B. & Q.; F. J. Dodds, general car inspector, A., T. & S. F.; P. Kass, superintendent car department, C., R. I. & P.; O. A. Wallace, supervisor car repairs, A. C. L.; T. J. Boring, general foreman, M. C. B. Clearing House, Penna.; H. E. Myers, master car builder, L. V.; H. H. Boyd, assistant chief motor power and rolling stock, Can. Pac.; A. E. Smith, vice-president, Union Tank Car Co., and A. H. Gaebler, superintendent car department, General American Transportation System.

Action.—The recommendations of the committee were approved and the report accepted.

Report on Locomotive Construction

The Committee on Locomotive Construction has during the year, given consideration to the following 15 subjects:

A—Design of fundamental parts of locomotives: Locomotive axles; driving-wheel centers of thin wall-section type; safety valves for locomotives; light-weight pistons.

B—Design of and repairs to locomotive springs.

C—Advantages and disadvantages of higher boiler pressures.

D—Roller bearings for locomotives and tenders.

E—Driving and trailer tires.

F—Code of rules to govern the movement and handling of locomotives which failed on the road due to broken parts.

G—Code of rules to govern the preparation of locomotives for storage in good order and care of such locomotives while in storage.

H—Code of rules to govern the firing-up of locomotives.

I—Exhaust-steam injectors and exhaust-steam feedwater heaters.

J—Development and use of oil-electric locomotives.

K—Failed parts of locomotives and methods of reporting, analyzing and correcting such failures.

L—Report of builder's subcommittee on method of determining locomotive weight distribution.

It is recommended that the following six subjects be submitted to letter ballot for adoption as recommended practice:

Spring-hanger clips for locomotive elliptic springs.

Code of Rules to govern the movement and handling of locomotives which fail on the road due to broken parts.

Code of Rules to govern the preparation of locomotives for storage in good order and care of such locomotives in storage.

Code of Rules to govern the firing-up of locomotives.

Method of analyzing and correcting failed parts of locomotives.

Method of determining locomotive weight distribution.

In addition to the above subjects the committee has given consideration to the reports of the Federal Coordinator of Transportation, dated April 24, 1934, and June 9, 1934, on the subject of steam locomotives. Report covering the committee's consideration of this subject has been made to the General Committee.

Locomotive Axles

In 1934, the Committee on Fundamental Parts of Locomotives submitted information on the subject of locomotive axles and mentioned a special design of built-up driving axle that is in use on the D., L. & W. The Lackawanna reports that axles of this composite construction are rendering good service and are affording satisfactory protection against the axle failures which they were designed to prevent.

Driving-Wheel Centers with Thin Walls

In 1934, your committee included a statement of railroads which had applied driving-wheel centers of various thin-wall section types and gave other information as to the diameter of wheels, types of locomtives, etc., on which the various wheel centers were in use. This statement has been brought up to date as of December 31, 1934, and is herewith submitted.

[Tabulated data showed the application of 186 driving-wheel centers of the double-disc type to 83 locomotives on 17 roads; the application of 524 driving-wheel centers of the Boxpok type to 212 locomotives on 18 roads and also the application of two wheel centers each of the Birdsboro thin-wall type and of the Univan type.—EDITOR.]

Inquiry as to the character of service rendered by the various types of special wheel centers has been made of the roads using them, and your committee finds that, with few exceptions, the character of service rendered is reported as being satisfactory. A few defects have been reported but they were said to be of a nature common to steel castings and the number smaller than would be expected of an equal number of ordinary design. Wheel centers of various thin-wall section types are still regarded as in the experimental stage on practically all the roads reporting; hence the committee offers no definite conclusions or recommendations.

Safety Valves

During the past two years, your committee has been considering the subject of safety valves for locomotives and has collected information from a large number of representative roads, as well as from locomotive builders and principal manufacturers. The information now carried in Section F of the Manual has also been considered.

As a result, the committee offers the following for consideration. This report is to be considered one of progress only, as there are a number of matters which it is felt should be given further consideration but which will require more time in which to obtain further information.

Safety valves used on locomotive boilers must conform to I. C. C. rules 34 to 36, inclusive.

The aggregate discharge capacity of all safety valves on any locomotive boiler must be equal to the maximum steam generating capacity of the boiler. The following formula will approximate the evaporative capacity of the average locomotive boiler:

$$W = 5.75\ S$$

W = Evaporative capacity of boiler in pounds of steam per hour.
S = Total evaporative surface in square feet.

For boilers having large grate area or short flues, the evaporative capacity should be calculated according to the formulas commonly used for determining boiler capacity in connection with steam consumption of locomotive cylinders, and, in cases of doubt or boilers of unusual construction, the evaporative capacity should be determined by actual test.

Manufacturers of safety valves should be required to furnish, for each safety valve offered for sale by them, a table giving the following information:

a—Range of pressures through which the safety valve is designed to operate.
b—The rates of discharge capacity of the safety valve in pounds per hour for the various pressures within its range.
c—Identification numbers or symbols designating the different springs used in the safety valve and the range of pressures through which each spring is to operate.

The size and number of safety valves to be used on any given boiler is to be determined from the maximum evaporative capacity of the boiler and the rated discharge capacities of safety valves as given by the manufacturers for the pressure to be carried on the locomotive.

Each safety-valve spring should be plainly marked by the

manufacturer to designate the make, type and size of safety valve in which it is to be used and the range of pressures through which it is to operate.

No safety valve is to be set for any pressure outside of the range stamped upon the spring used within it.

When applying safety valves, they should be located as high above the water level in the boiler as clearance limitations will permit, preferably above the point where the height of steam space above the water is least influenced by gradients.

Safety valves should be applied in a vertical position if possible, and openings for them in dome cap or boiler should not be spaced closer together than shown on page 73, Section F of the Manual.

Each safety valve should have a full-size direct connection to the boiler or steam dome. If safety valves are mounted upon a manifold or auxiliary dome, the area of the opening between the boiler and dome must be not less than the combined areas of the inlet opening in the bases of safety valves mounted thereon.

Safety-valve bases should be of the female type and applied to suitable brass sleeves screwed into the boiler or steam dome, the threading of safety-valve bases and sleeves to conform to the railway company's standards.

Safety-valve bases are to be provided with hexagonal wrench fits.

Locomotive safety valves should be set to open at pressures as indicated in the following table:

Number of safety valves on Boiler	Pops set to open at			
	1st or working pop	2nd pop	3rd pop	4th pop and all others
2	Working pressure	Working press. plus 2 lb.		
3	Working pressure	Working press. plus 2 lb.	Working press. plus 5 lb.	
4 or more	Working pressure	Working press. plus 2 lb.	Working press. plus 4 lb.	Working press. plus 6 lb.

Safety valves should be designed and adjusted to close with the least possible reduction in pressure consistent with durability of parts and satisfactory relieving capacity. In no case should the reduction in pressure required for safety-valve closure amount to more than 2 per cent of the pressure at which the safety valve is set to open.

Higher Boiler Pressures

[Reports were given covering the performance of a multi-pressure locomotive on New York Central; several water-tube firebox locomotives on the Delaware & Hudson; also stayed boilers carrying high pressures on the Canadian Pacific, Chesapeake & Ohio, Chicago & North Western, Delaware, Lackawanna & Western, Lehigh Valley, Missouri Pacific, New York Central, Norfolk & Western and a report from the American Locomotive Company.—EDITOR.]

SUMMARY

Disadvantages—increase in failures of firebox staybolts, firebox sheets, higher material cost, and increased weight of boiler when limited to the usual tried material.

Steam economy may be obtained in single-expansion locomotives by increase of expansion ratio, which involves along with higher steam pressure and temperature a short cutoff and later release, using independent admission and exhaust valves, thereby giving quick flow and volume to the initial steam action and controlled compression.

With higher steam pressure a smaller diameter of cylinder with longer stroke can be used for power requirements, in which case larger diameter driving wheels, lighter counterbalance and smoother running locomotive and a smaller steam consumption are possible.

The use of water-tube firebox with higher boiler pressure effects maintenance economy in that staybolt failures and labor of testing them is no longer troublesome, and there is no increase in terminal delay due to boiler-washing period, as double crew can be employed by working one on each side of the firebox.

Sidewall insulation on firebox can be run from shopping to shopping, needing only occasional plastering of the joints which contact with the tube and door-sheet joint.

Nickel-steel fireboxes are reported by a limited number of railroads as giving no trouble and where used in shells of boilers no difficulties are experienced. Use of high-tensile silicon-steel sheets allowing the application of thinner sheets of reduced weight has developed no trouble.

One road applying steel staybolts in water space on 40 locomotives in 1930 reports to date no trouble experienced.

One road reports that as their high-pressure boilers become older, all the advantages of higher boiler pressure have been maintained and maintenance of the alloy steel boilers has been relatively less than for the lower-pressure carbon steel boilers.

It has been suggested that from the standpoint of locomotive efficiency and economy, the railroads will have to follow the established practice of central power stations and steamships in using higher steam pressures.

As applying to steam locomotives, with the present state of the metallurgical art and from the standpoint of the utilization of the present heat in the steam, it is thought that 500 lb. pressure and about 750 deg. F. total temperature should be an established limit as compared with from 1,200 to 1,400 lb. and from 800 to 900 deg. F. as limits for central power station operation, all of which has presented no unusual problems.

Roller Bearings

Replies to questionnaire dated May 31, 1934, were submitted by 81 roads; 25 roads reported applications and furnished data for the period June 1, 1934, to December 1, 1934; 56 roads reported no applications of roller bearings to locomotives and tenders. Five roads which submitted data for previous analysis did not resubmit data in connection with the present study.

The attached statement briefly outlines the status of roller bearing applications as of December, 1934. Although the statement reflects incomplete reports, it is evident some progress has been made during 1934 in extending roller bearings to driving axles and in general the analysis discloses encouraging results, very few actual service failures having been reported.

[Tabulations cover replies from seven roads, show type of bearing, location of installation and information as to service results.—EDITOR.]

In commenting on the application of roller bearings to rods, one road advanced the following information: "Crank-pin bearings and their special rods and crank pins are still in the early development stage and require care in the back shop and engine-house beyond that ordinarily required for lateral adjustments and friction bearings. Precision fitting and extremely careful lubrication are required to maintain these pins and bearings, crosshead-pin bearings and special materials and construction details which go with them, and have been the most difficult problem in the application of roller bearings."

Another road advanced the following information: "About a year since we applied roller bearings to the main pins of a passenger locomotive (back end of main rods and main section of side rods). This locomotive is a Pacific type having weight on drivers of 192,500 lb., a tractive force of 42,750 lb., 24 in. by 28 in. cylinders and 225 lb. boiler pressure. It has now approximately 100,000 miles of service, which has been so satisfactory that arrangements are being made to apply a second set with the addition that the roller bearings will also be used on the eccentric-crank arms."

Perhaps the main problem connected with roller-bearing application has been in connection with broken and failed axles, due to stress concentrations that have not been fully understood. Several roads have subjected their axle designs to photo-elastic studies, disclosing serious localized stress conditions which were undoubtedly the cause of the failures and have thus been able to redesign axles and introduce stress-relief grooves in hubs, with beneficial results. The photo-elastic method has even a wider application in study of stresses in various locomotive parts.

The subcommittee expects to have additional general and valuable information on this subject in connection with the data to be submitted on the questionnaire for each six months' period during the year 1935.

Driving and Trailer Tires

This subcommittee has been augmented by two members of the Specifications Committee and is co-operating with the Technical Committee of the Tire Manufacturers Association.

A questionnaire was prepared early in 1934 and sent out to all railroads, requesting detailed reports of tire failures on steam and electric locomotives for a period June 1 to December 1, 1934. This information was received, tabulated and important information analyzed by the joint committee. It was found that a wide variation existed in description of tire failures and in explanations as submitted. It has therefore been difficult to clarify the causes of the tire failures which were reported. Many reports were not clear as to whether the tire actually ruptured in service or whether it was removed on account of finding cracks. There is also a great difference of opinion as to the reporting of shelled treads and as to cracks developing from the bore, some roads apparently attributing these defects to faulty material, whereas a careful analysis in many cases would develop that improper machining and mounting—leaving ragged tool cuts—caused the starting of cracks which developed in the bore.

It was therefore felt that, while the information collected was of value, more detailed instructions should be prepared for the tabulation of tire failures in response to the questionnaire which has been issued covering the period December 1, 1934, to

June 1, 1935. The committee has therefore classified the types of failures in order that the roads can definitely report tire failures under one of these headings. This classification as proposed by the committee is as follows:

CLASSIFICATION OF TIRE FAILURES

Report should be made of all tire failures comprising a complete rupture of the tire, or a defect sufficiently serious to require the removal of the tire from service, either on account of safety or for the purpose of a more detailed investigation.

A study of the tire failures which have been submitted indicates that the failures can be classified under the following types: Reference is made to figures which will be found in the A. A. R. Wheel and Axle Manual, Revised Feb., 1935.

1—Thermal Cracks—These cracks, or checks, develop in the tread or flange at right angles to the plane of the tire—see figures 40, 41, 42 and 43. Defects so reported are variously described and include the following: Brake burns, and structural transformation due to heat.

2—Shelled Tread—Shelling consists of a break-down, or flaking, or spalling of the tread—see figures 31, 32, 33, 34 and 35. Shelling may extend completely around the circumference of the tread and may penetrate to a considerable depth. If the defect cannot be removed by a cut 3/8 in. deep it should be classified as "deep shelled" and be so reported. See figures 38 and 39.

3—Cracks in Bore—Cracks originating at the surface of the bore due to mechanical causes are variously described and include the following progressive fractures originating in any part of the bore, lip, groove, rivet or bolt holes: Tears in bore by machining; improper fit surfaces, such as taper, convex or concave bore of tire or outside diameter of wheel center; rim pockets in wheel center; caps between shims or overlapping shims; wheel centers out of round; corrosion of bore; excessive shrinkage.

4—Welding or Torch Burns—These defects may be due to burning by arc contacting or by gas torch.

5—Shattered—A shattered condition develops when a portion of flange or rim parts from the remainder of the tire and shows on parting smooth surfaces of any considerable area. This parting usually develops in a circumferential direction. See figures 20, 21, 22 and 23.

6—Gas Pocket—A void or discontinuity of metal in the section of tire, which may or may not be apparent on the surface.

7—Segregation, or Improper Chemical Composition—This condition should only be reported when verified by laboratory investigation.

8—Cause Unknown—Searching investigation should be made of each failure to determine, if possible, the correct cause and classification to avoid as far as possible reporting the cause as unknown.

The reports furnished were reviewed from several standpoints in the effort to ascertain if the majority of failures could be attributed to chemical content of the steel, to practices in manufacture, to road limits followed, to the location on the locomotive of the tire which failed, or to the year or time of year in which the tire was manufactured. This information has been tabulated and reviewed, but it is felt that in this analysis again, so much difference of opinion exists as to causes of failures that the committee should await the reports of the next six-months' period before drawing any conclusions with respect to these items and making more detailed reports.

The committee wishes to impress upon railroads reporting tire failures that the information as submitted has been of much value and that it is of great importance to the roads, as well as the tire manufacturers, that the committee should be continued and that further reports should be made covering tire failures which occur within the period June 1, 1935, to December 1, 1935.

Codes of Rules

[The committee submitted three Codes of Rules. These were:

1—Code of Rules to govern the movement and handling of locomotives which fail on the road due to broken parts.

2—Code of Rules to govern the preparation of locomotives for storage in good order and care of such locomotives in storage.

3—Code of Rules to govern the firing up of locomotives.

It is proposed to submit these codes to letter ballot.—EDITOR.]

Exhaust Steam Injectors and Feed Water Heaters

Thirty-six roads were canvassed to develop the number of additional exhaust-steam injector and feedwater heater applications contemplated during 1935 on existing locomotives. Thirty roads reported no applications were contemplated during 1935. Six roads advised programs in effect which total 91 applications divided into 81 feedwater heaters and 10 exhaust-steam injectors.

Manufacturers were also contacted to obtain information in regard to improvements in their respective equipments but the information furnished was meagre, however, additional applications for 1933 and 1934 were reported by the various companies as follows:

MANUFACTURER	1933	1934
Worthington Corporation	23	66
Wilson Engineering Company	6	15
Wm. Sellers & Company (Exhaust steam injectors)	..	5
Superheater Co.	Not furnished	
J. S. Coffin	Not furnished	

Although efforts were made to ascertain the total number of locomotives equipped to date with the various types of feedwater heaters and exhaust-steam injectors, the information furnished is not complete.

The feedwater heater has become an acknowledged necessity on modern locomotives from the standpoint of fuel economy, water saving and improved service. Manufacturers have been aware of the necessity for improving their products and feedwater heaters may now be regarded as standard equipment the same as the superheater. During the past several years the various types of heaters and exhaust-steam injectors in general have undergone improvements in design and application which are reflected in lower maintenance and more reliable performance. Considering the established status of the feedwater heaters the committee will hereafter confine its investigation and reports to the exhaust-steam injector.

Oil-Electric Locomotives

Your committee on subject of "Development and Use of Oil Electric Locomotives" obtained statistics for the year 1934, covering the individual oil-electrics placed in service throughout the states, but did not secure operating costs per hour as, due to location, service hours per day, and manner of reporting, these are not definitely established.

A review of statistics is conclusive that the 600-hp. Diesel locomotive is the most favorable at present, and while the 300-hp. Diesel locomotive unit is noted at 55.87 per cent of the total, at least one-half of these locomotives are three-power units with internal power developed by 300-hp. oil-engine set.

It is noticeable that present trend is toward greater capacity and 800-, 900-, and 1,200-hp. Diesel locomotives may be assigned for test in yard switching service. Furthermore, units of 1,800 hp. and 2,000 hp. are under construction for assignment to road service and passenger-train service in either single or articulated units, from which total horsepower development can be obtained to haul the heavier freight and passenger trains at prevailing speeds.

This development will be watched and with modern improvements in design and construction and attending stand-by losses with oil electric locomotives, it may show economic operation, and with satisfactory operating conditions and conservative maintenance costs, will invite attention for further consideration.

Method of Determining Locomotive Weight Distribution

In order to determine the weight distribution of a locomotive, by which is meant the weight at the rail under each pair of wheels, it is necessary to have the following information:

1—Complete total weight of locomotive (without tender)

2—Dead weights

3—Longitudinal center of gravity

4—Proportion of spring rigging and equalizers, either from drawings or by actual measurements.

The total weight of the locomotive can be obtained on any railroad or builder's scales which have sufficient capacity. If locomotive is disconnected from tender while being weighed, keep such parts between engine and tender as are supported by the engine—such as drawbars and safety bars, flexible joints, etc.—on the engine. If locomotive is not disconnected from the tender, have buffer loosened so that there will be no binding of buffer or drawbars. It is preferable not to disconnect the engine and tender unless otherwise necessary.

By "dead weights" is meant the weight of all parts below the spring rigging, and therefore not supported by the spring rigging. The total dead weight must be determined for each pair of wheels separately and for driving wheels is the sum of the individual weights as follows: 1 axle; 2 boxes and saddles or equalizers over boxes, if any; 2 wheel centers; 2 tires; 2 crank pins and all rods bearing on crank pins, both main and side rods. Also eccentric crank for main wheels. One-half of eccentric rod.

For engine trucks, where the weight is carried directly on the engine-truck center plate, the total weight of the truck is dead weight. This is also true for trailer trucks which carry the weight on a single center plate. For other trailing trucks, such as the Delta truck, or articulated trucks, where the weight is carried at more than one point to the truck, the dead weights again become the parts below the truck equalizing system. For such a truck, the dead weights for a pair of wheels include the following: 1 axle; 2 wheels with tires; 2 boxes. If booster is used, add the weight of the booster axle gear and that part of the booster weight which is carried by the axle.

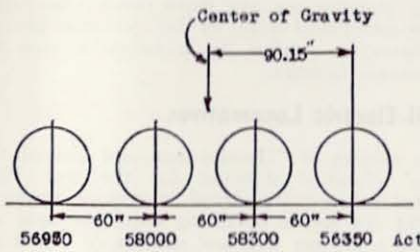
The longitudinal center of gravity of a locomotive can be determined by two practical methods. The locomotive can be balanced on a turntable, and when it is perfectly balanced, the center of gravity is directly over the center of the turntable; or by using individual scales, by which the weight on each pair of wheels can be obtained. Some individual scales record the total weight on one pair of wheels, while others record the

weight on each wheel. In this latter case, the sum of the two readings must be taken for the total weight on one pair.

When individual scales are used, the longitudinal center of gravity of the total locomotive is obtained as follows:

As a matter of convenience the reference plane from which all moments are taken shall be the vertical centerline of the front wheel of the locomotive regardless of whether there is or is not a front truck.

The following example will show how this is done:



56350	x 0	=	0
58300	x 60	=	3,498,000
58000	x 120	=	6,960,000
56950	x 180	=	10,251,000
229600			20,709,000

$$\frac{20,709,000}{229600} = 90.15" \text{ to c. of g.}$$

Calculation of Center of Gravity from Scale Weights

After obtaining the center of gravity for the complete locomotive by either of these methods, it is necessary to get the center of gravity for that part of the locomotive carried by the spring rigging which will include everything but the dead weights. To do this, subtract the moment for the center of gravity of all dead weight from the moment for the center of gravity for the complete locomotive, the result being the moment for the spring-borne weight. Dividing this by the spring-borne weight will locate the center of gravity of the spring-borne weight.

After getting the center of gravity of the spring-borne weight, it is necessary to find the proportion of this weight which is carried by each equalizing system, as there are always two separate equalizing systems on a locomotive, one forward and one back. The theoretical point of support of these percentages is the point from which the spring-borne weight is distributed in accordance with the equalizing system.

To determine the proportion of spring-borne weight on each axle, first consider that the driving axle in each system which has the least dead weight, is unity or 100 per cent. The other axle percentages in each system are determined from this, depending upon the proportion of the equalizers. From the examples illustrated, it can be seen that the front and back driving axles are considered 100 per cent and the spring borne weight for the other axles is proportioned from this, using a lower percentage on axles with higher dead weight so as to keep the rail loads as nearly equal as possible.

After locating the theoretical point of support for each equalizer system, proportion the amount of the total spring-borne weight which comes on each point of support, in accordance with its longitudinal distance from the center of gravity of the total spring-borne weight. Then for each system, subdivided the weight at the point of support among the various axles, and center plate for the engine truck, according to the percentages previously figured. This will give the distribution of the spring-borne weight to each axle and to this the dead weights are added, giving the distribution at the rail.

[The methods of determining the proportion of spring-borne weight on the various axles for the usual arrangements of equalization and accompanying diagrams indicating the method of calculation for getting the center of gravity and for obtaining the weight distribution as outlined for the usual locomotive wheel arrangement accompanied the report. These have been omitted from this abstract. This portion of the report was prepared by R. S. McConnell, Baldwin Locomotive Works; J. G. Blunt, American Locomotive Company and W. E. Woodard, Lima Locomotive Works. It is proposed to submit the method outlined to letter ballot.—EDITOR.]

The full report was signed by W. I. Cantley, (chairman), mechanical engineer, L. V.; H. H. Lanning (vice-chairman), mechanical engineer, A., T. & S. F.; R. G. Bennett, general superintendent motive power, Penna.; G. McCormick, general superintendent motive power, So. Pac.; W. F. Connal, mechanical engineer, Can. Nat.; G. H. Emerson, chief motive power and equipment, B. & O.; A. H. Fetters, general mechanical engineer, U. P.; J. E. Ennis, engineer assistant, N. Y. C.; S. S. Riegel, mechanical engineer, D., L. & W.; D. S. Ellis, engineer motive power, C. & O., and C. Harter, chief mechanical engineer, Mo. Pac.

Discussion

J. W. Burnett, general superintendent of motive power and machinery of the Union Pacific, stated that he was finding it advisable to replace brass sleeves between safety valve bases and the boiler with steel sleeves and asked if the committee would be willing to change its recommendation by omitting reference to brass as the material to be used in the sleeves. H. H. Lanning, mechanical engineer, Atchison, Topeka & Santa Fe, chairman of the sub-committee, said that the committee would take this under consideration. In answer to a question he also said that it was not the intention of the committee to have anything to do with the interior parts of safety valves but to confine itself to the consideration of requisites and attachments.

Mr. Burnett also questioned the desirability of establishing a standard code of rules governing the handling of locomotives which fail on the road. These are situations, he said, which must be dealt with according to circumstances and he felt that any code of rules issued by the division might be misunderstood. D. S. Ellis, engineer of motive power, Chesapeake & Ohio, the sub-committee chairman, said that it was not the intention of the committee to establish a standard code but that it had brought together the best provisions of such rules as were in effect on roads having codes of their own into a code which might serve as a model to assist other roads, some of which had specifically requested that they be given such help.

Action.—The report was accepted.

Report on Brakes and Brake Equipment

The following report is submitted for consideration:

Air-Brake Piping

Prior to 1929 the air-brake piping for freight cars in general use was single-weight pipe. During that year extra heavy pipe, except nipples at angle cocks, was adopted as recommended practice. We recommend advancing to standard, the present recommended practice for air-brake piping on freight cars.

Welding Brake Beams

Rule 23, Section 4, permits welding cracks or fractures in brake beams, while the same rule, Section 3, permits welding only parts under compression in brake-beam heads. We believe Section 4 permits too much latitude in the repairs to brake beams, and may result in attempts to weld cracks and fractures in compression members, tension members and struts. Compression and tension members having cracks or fractures involving 40 per cent of the area of these parts, should be renewed instead of welded and we recommend the elimination of this item from Rule 23.

Geared Hand Brakes

A joint committee of the Safety Appliance, Car Construction and Brake Committee have formulated proposed specifications for geared hand brakes in accordance with the reasons set forth in the report of the Car Construction Committee.

During recent months this study, which includes geared hand brakes of the vertical-wheel, horizontal-wheel and lever types, has actively been proceeded with and the tentative specifications jointly agreed upon and concurred with in principle by the Director of the Bureau of Safety of the I. C. C., with whom your representatives have consulted on this question. Subsequently, conferences were held with the various manufacturers and the matter brought to the following conclusions:

For application to new freight cars, or for new installations to existing freight cars, this committee recommends for adoption as standard, proposed specifications for geared hand brakes as follows, and also recommends inclusion in the Interchange Rules of the following requirements in the event favorable action is taken in connection with this recommendation:

Geared hand brakes applied to cars built new on or after January 1, 1936, must comply with the requirements of the A.A.R. specifications.

All new installations of hand brakes made on or after January 1, 1936, must comply with the requirements of the A.A.R. specifications.

[The proposed specifications for vertical-wheel and horizontal-wheel geared hand brakes has been omitted.—EDITOR.]

Operation of Passenger Cars in Freight Trains

Owing to the increased number of refrigerator cars having passenger brake equipment, especially the U. C. brake, that are handled in freight trains, it has been suggested that consideration be given to the question as to whether it is advisable to cut out the emergency reservoir on cars having U. C. brakes, remove the protection valve spring and let out the piston travel on such cars when handled in freight trains. The subject was referred to a subcommittee which reports as follows:

The subcommittee discussed the foregoing at length with members of the engineering department of the Westinghouse Air Brake Company and conducted certain rack tests bearing on the subject.

[Details of the rack tests are omitted. Standing road tests were then made with a baggage car having a U-12-B universal valve at the rear end of 101 freight cars equipped with K triple valves. Conclusions were based on these rack and road tests.—EDITOR.]

The conclusions of the sub-committee are:

1—Passenger cars having graduated-release feature must have this feature cut out for movement in freight trains.
2—Piston travel should be not less than 7 in., preferably 8 in.
3—That the time and labor involved in disconnecting the emergency reservoir and plugging the connections, or removing the protection valve spring from U. C. equipment in cars to be handled in freight service and recoupling them upon return of the car to passenger service is not justified by service performance.
4—The water-raising system on a passenger car when handled in freight service should be cut out when conditions permit, and cutout cock is available in water system supply pipe.

Life Period for Air-Hose Renewals

This question was thoroughly discussed by the Air Brake Association during the years 1917 and 1918 and their recommendations at that time were not definite, although it appears that they considered 28 months as approximately the period air brake hose should be allowed to remain in service; notwithstanding the fact that 65 per cent of the failed hose inspected by their committee had given more than 28 months' service.

In 1919 the question was referred to this committee, which, after thorough investigation, concluded that a review of the data available and which they were able to gather did not justify a definite recommendation as to a period during which hose should be arbitrarily removed, and, in 1922 after further investigation, were still of the same opinion and suggested a revision of air-brake hose specifications to provide a better quality of hose under the direction of the Committee on Specifications and Tests for Materials. Since that time the matter has rested until recently a member line has requested that some definite conclusion be set forth in connection with the inspection and life of air hose to prevent hose failures.

A subcommittee has gone into the question, having been in conference with some representative lines and finds that quite extensive investigations have been made on the subject, varying from 28,000 to 35,000 hose and in all reports seen it is noted that the larger number of hose that failed were by no means the oldest hose. The opinion of your committee has not changed after this conference relative to the possibility of establishing a specified life for an air hose which will condemn it for further service. If hose are removed on this basis it would cause a large increase in hose consumption in proportion to the number of failures that would be prevented, therefore, we believe that the most satisfactory results will be obtained from the proper education of the car inspector that he may use good judgment while inspecting the air hose. This committee from personal observation in checking a large number of hose has found the same condition.

The series of photographs shown under Rule 56 of the A. A. R. Code of Rules, no doubt, furnishes a good education for the inspector. It is recognized that the judgment of inspectors will be found faulty at times if hose is placed on test rack, but under present specifications of the manufacturers and conditions which hose are subjected to, that is, undue strains account pulling hose when uncoupling, storing of cars at which time hose deteriorate very rapidly, the improper application of couplings and nipples, also position of angle cocks, which are important features in shops, proper education of inspectors is about all the recommendation that can be made at the present time.

As a result of a conference with the Specification Committee they agreed that the subject would be taken up with the manufacturers and a further report may be forthcoming.

Wasp Excluders

This committee had brought to its attention about five years ago the question of providing a means of preventing wasps, mud bees or other insects from building nests in retaining valves, and closing the exhaust openings.

Five years ago the air brake companies developed a brass plug equipped with slotted openings for application to the retaining-valve exhaust port to overcome the trouble. This plug was not entirely satisfactory. Subsequently they modified the design of plug, using narrower slots, and a number of this type were applied by several roads. They appeared satisfactory, which led this committee to recommend them for adoption as recommended practice in order to provide for a more liberal application in service to determine if they justified adoption as standard.

During the past winter complaints have been received that the recommended-practice type adopted last year have given trouble due to ice and sleet freezing the openings on account of the device protruding outside the valve body. The troubles incident to wasps and mud bees entering the retaining valve exhaust opening and preventing a proper release of the brake is still serious enough to justify the further development of a means to overcome this trouble.

We, therefore, recommend substituting as recommended practice the type of wasp excluder shown in Fig. 1 for that adopted last year. (Drawing omitted from abstract.)

Graduating Spring for K Triple Valve

There has been some complaint regarding the proper tension of many new type graduating springs applied to K triple valve to reduce the tendency for undesired emergency.

Last year we recommended the use of a device for checking such springs before they were applied, the use of such device being optional.

In view of the apparent use of springs of improper capacity in many cases, we now recommend making the device for checking graduating springs, K triple valve, as shown in the Manual a standard part of the 3-T test rack.

Self-Locking Angle-Cock Handle

During the current year, the air brake manufacturers, in conjunction with representatives of the Committee on Brakes and Brake Equipment, have developed modifications in the locking feature of the self-locking angle cock which, in the judgment of the committee, will materially prolong the life of the handle and key socket of the locking-type angle cock.

The results to be anticipated with this improved construction are closer maintained alinement of the locking surfaces and the prevention of vibration and resultant wear when the car is in motion, thereby providing proper functioning of the device for long periods with minimum maintenance expense.

While there are no A. A. R. standard dimensions for the handle and socket key shown on the drawing (omitted from this abstract), and we see no reason why there should be at this time, the committee recommends their general use in purchasing new complete angle cocks and that, where renewals of handles and keys are made, the improved design should be used.

Brake-Beam Hangers

Page E-6, Section E, of the Manual shows the loop and stirrup type brake-beam hangers commonly used on freight equipment as being ¾ in. by $1\frac{3}{16}$ top and bottom for the former and the same dimension for the bottom of the latter.

These hangers are formed from 1-in. round iron or steel and it is found there is not sufficient metal without upsetting at those points to provide for the dimensions shown.

We recommend substituting the drawing Fig. 2 for that now shown in order that it will be practical to make hangers to conform to the drawings covering same. (Drawing omitted.)

Retaining-Valve Piping for Passenger Cars

The Arbitration Committee has requested us to give consideration to developing means whereby the necessity for disconnecting and connecting retaining-valve pipe on passenger cars to meet requirements of the individual roads may be eliminated.

The Arbitration Committee has also requested that, in the event of inability to accomplish this, consideration should be given to providing a standard method of installing retaining-valve piping on passenger cars, so as to provide uniform location of retaining-valve pipe fitting to be broken and disconnected in accordance with present practice and to minimize chances for disconnected pipe to become clogged with snow, etc.

At present there seems to be no standard location of union fitting in the retaining-valve pipe, which frequently results in loss of time in locating the fitting which is to be connected or disconnected as may be required. Moreover, disconnected pipes as they are now arranged have in many cases become plugged with snow, ice, etc., resulting in delays and stuck brakes.

The committee recommends that, where retaining valves are applied to passenger cars, the pipe should be arranged in accordance with Fig. 3. (Omitted from abstract.)

It will be noted that the drawing calls for a 4-in. to 8-in.

branch in the pipe adjacent to the control valve, the pipe having a standard coupling which is at open end.

To make retaining valve operative, it is only necessary to apply a pipe plug to the coupling in the branch.

Where roads do not require the use of retainers and want the pipe disconnected, desired operation can be had by removing the plug from the branch outlet.

Should the branch pipe become plugged at the coupling, no serious difficulty would result therefrom, as release of the brakes can be had through the main pipe line and the retaining valve.

We believe that adoption of the proposed piping arrangement will accomplish the results desired by the Arbitration Committee, and it is so recommended.

Passenger Retaining Valve

Use of the graduated-release feature of the passenger brake on mountain grades is becoming quite prevalent, but there are at present several roads that are using retaining valves on passenger equipment cars in grade service, and require that retaining valves and pipe be maintained in a serviceable condition.

This committee has considered the subject, as we appreciate with improved passenger brake equipment and tight brake cylinders the former method of using retainers is not entirely satisfactory and we believe a modification in retaining valves might be made to the end that the trainmen would not be called upon to pass frequently through the train for the purpose of turning the valve up or down and also more satisfactorily to provide for adequate retainer control of head-end cars so constructed that the retaining valve cannot be conveniently reached.

In the early days when brake cylinders were subject to more or less leakage, it was desirable that a definite pressure value be provided for. However, with the present tight cylinders and modern brake operating conditions with graduated-release feature, it is felt that a safe and quite flexible control of trains may be had through both light- and heavy-grade territory by a simple modification in the present retaining valve, i. e., drilling a fixed orifice through the closing valve of the retaining valve. By such modification the pressure may be completely released to avoid excessive speed or stalling where trains are passing through sags or on level sections of track or on adverse grade sections of a generally descending grade.

Some roads do not use passenger retaining valves on grades, but rely upon the graduated-release feature which is available in the LN and UC equipments. The graduated-release feature affords an excellent means for controlling the train speed on grades, but, as the brake release in each cycle occurs at the normal fast rate, sufficient time is not always available to insure a complete recharge, and the charged pressure sometimes reduces as the brake cycle progress. This reduction of the charged pressure is undesirable because it necessitates speed reduction to provide for thorough recharging.

Tests of passenger trains have been made on grades of 2 to 3½ per cent by our subcommittee dealing with the subject and they have recommended a modification of the retaining valve to provide greater flexibility of train operation.

We recommend as standard practice the change in passenger retaining valves shown in Fig. 4 (omitted) which illustrates the proposed modification of the retainer closing valve and a tabulated schedule of orifice sizes to be used in the retaining valves for various sizes of brake cylinders. The modification involves no new material and can easily be made in any shop at small expense.

Reworked Brake Beams

Due to complaints received as to failure of second-hand brake beams applied to foreign cars—many of such beams apparently being but slightly above the condemning limits when applied—a joint subcommittee, consisting of members of the Arbitration, Brake and Car Construction Committees, was appointed with request that specification be provided which would result in a reclaimed beam of reasonably satisfactory service life expectancy to car owner and eliminate many of the failures now being experienced as a result of second-hand brake-beam applications. This joint subcommittee has completed its report, which will be submitted for letter ballot just as soon as approval of the various committees involved can be secured. Your Committee on Brakes and Brake Equipment has approved the report of the joint subcommittee.

Identification Mark for Brake-Shoe Key

This committee has been requested to suggest some form of marking the new standard A. A. R. brake shoe key in order to avoid confusion in billing where such keys are applied. Without some means of identification, inspectors and others have no means of identifying the new key and will either fail to make proper bills or render bills for the old standard key.

The marking shown on the brake shoe key (drawing omitted here) has been used by one road for some time and they have no difficulty in providing this marking. We would recommend revising the drawing on Page E-90 of the Manual to conform.

The report was signed by G. H. Wood (chairman), supervisor air brakes, A. T. & S. F.; W. H. Clegg (vice-chairman), chief inspector air brakes and car heating equipment, Can. Nat.; B. P. Flory, superintendent motive power, N. Y. O. & W.; T. L. Burton, air brake engineer, N. Y. C.; M. Purcell, general air brake inspector, No. Pac.; W. J. O'Neill, general mechanical superintendent, D. & R. G. W.; M. A. Kinney, general master mechanic, C. & O.; R. C. Burns, general foreman, Penna.; L. S. Ayer, general air brake inspector, So. Pac., and J. P. Stewart, general supervisor air brakes, Mo. Pac.

Brake Shoes

Supplementing the general report of the committee there was an additional report by a sub-committee on brake shoes. This supplementary report brought out clearly the pressing need for brake shoes of greater superiority and durability than the present standard plain chilled iron shoes with a reinforced steel back.

A check made of 41,830 freight-car brake shoes removed at 19 terminals on 9 representative roads showed that 22,262 shoes, or 53 per cent, had been removed on account of being broken and still retaining the lug portion. The average thickness of these shoes was 31/32 in. at the point of fracture. A representative high-speed road reported that it had purchased 63,400 plain chilled iron brake shoes during a period of three years. Comparative road tests which they had made showed that 25,350 shoes with an expanded metal insert would have given the same service with a saving of about $10,580 per year. Cases were cited where roads had been satisfactorily following the practice for years of finishing out the wear of expanded-metal insert shoes on freight cars with chilled iron wheels. Attention was also called to testing-machine records which showed that there is very little difference in co-efficient values for plain chilled shoes and those with expanded metal inserts on chilled cast wheels. Advantages given by the sub-committee for expanded metal insert shoes are greater safety, adequate reinforcement of body metal, reduced breakage, higher co-efficient values, and greater economy in spite of higher initial cost.

Drawings and proposed specifications for brake shoes with expanded metal inserts were submitted. The sub-committee report was signed by W. H. Clegg (chairman), T. L. Burton and R. C. Burns.

Action.—The report was accepted and necessary recommendations referred to letter ballot.

Railroad Reorganization Bill Reported in House

(*Continued from page 1012*)

eliminating the duplication of expense. The bill provides in subsection (c), paragraph (11) for the development of such information by the Commission at actual cost.

The present act has been found impracticable in that under its provisions it is not regarded as possible for the court to authorize a sale of the branch line of the debtor when its severance is to the good interest of the debtor's estate, as well as in the public interest. In order to clarify this uncertainty and to facilitate such abandonments, H. R. 8587 carries a provision in subsection (o) authorizing such sales under terms to be approved by the Commission and the court and designed to protect the interests of all parties concerned.

Section 77 contains no provision with reference to the reduction of fixed charges in the reorganized capital structure of the debtor. This matter has received the attention of your committee. It has not been deemed advisable to prescribe an unchanging standard or formula by which the amount of the fixed charges should be prescribed, it being thought that a certain flexibility is necessary in the development of reorganization plans in light of the particular circumstances of the widely varying cases. Subsection (b), clause (4), provides that the plan of reorganization shall require fixed charges in such an amount that, after due consideration of the probable prospective earnings of the property in light of its earnings experience, there shall be adequate coverage of such fixed charges by the probable earnings available for the payment thereof. Under this provision the Commission will be required to prevent the development of capital structures under which there will not be earnings sufficient to protect the fixed charges.

Recent Equipment Developments...

Air Preheater for Locomotive Fireboxes

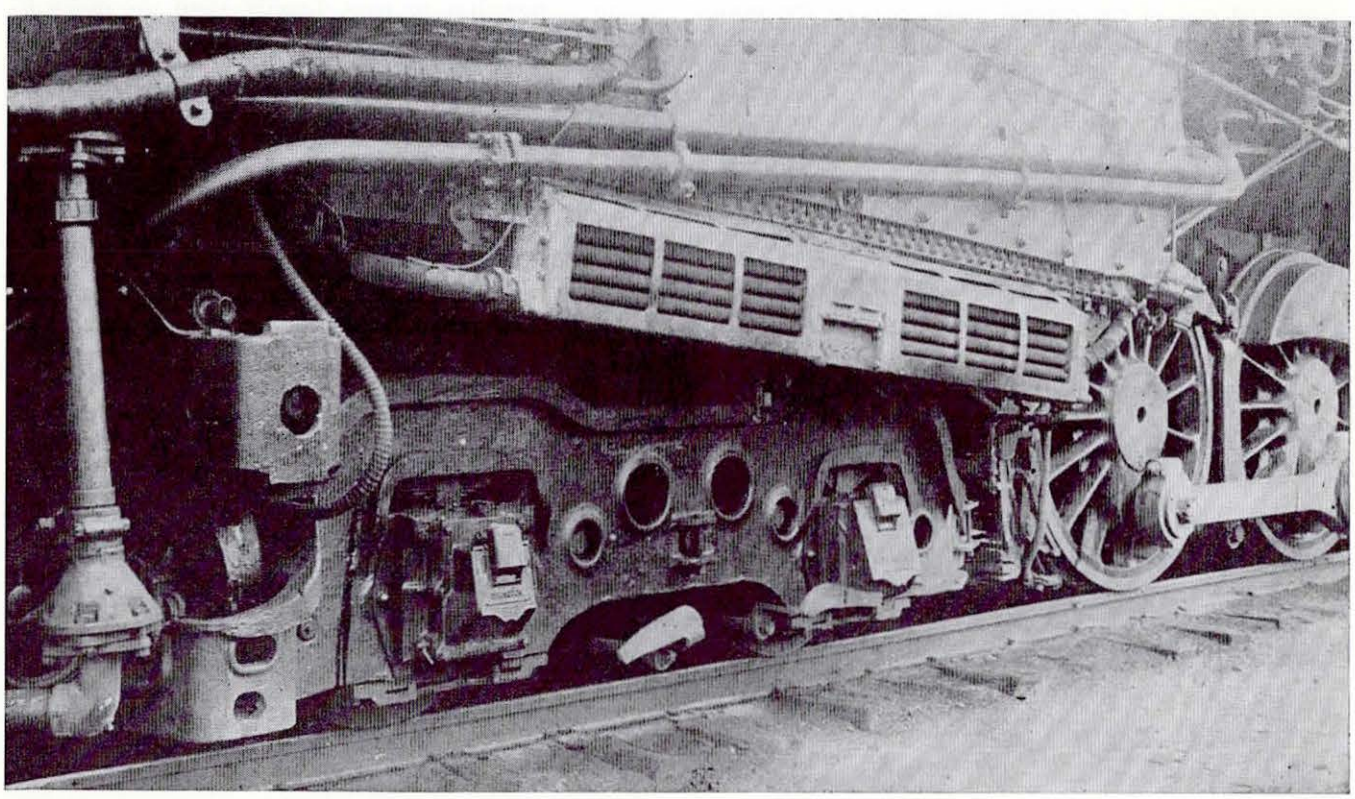
ONE of the recent developments of the Lima Locomotive Works, Inc., New York, is an air preheater for locomotive fireboxes designed to raise the temperature of the air used for combustion in order to effect uniform combustion conditions, fuel economy, an increase in evaporative efficiency, and a reduction in firebox maintenance. In the conventional locomotive side-sheet maintenance is aggravated due to cold air coming in contact with the side sheets, and their consequent expansion and contraction causes warped and cracked side sheets and leaky staybolts and rivets. A preheater of this type was applied to a modern 2-10-4 type locomotive and has now been in service for approximately 18 months. The locomotive so equipped is said to have shown a marked reduction in side-sheet maintenance, warping and cracking. Leakage of staybolts and mud-ring rivets has been reduced to a minimum.

Tests were made in January, 1934 of two locomotives of identically the same design, except that one was equipped with the preheater and the other was not, and for the preheater locomotive an average fuel saving per unit of work of between 7 and 8 per cent was indicated and the evaporation per pound of coal was correspondingly increased. At the time these tests were made the average outside temperature was 32 deg. Readings taken simultaneously at four different locations within the ashpan showed that the temperature of the air entering the ashpan averaged 205 deg.

Some idea of the manner in which the preheater is applied may be gained by reference to the accompanying illustration. The heater is applied in two sections, one on each side of the firebox directly under the mud ring. The heater sections are comprised of casings, each containing a number of finned tubes. The tubes are located relatively close together and in staggered fashion so as to provide maximum efficiency in heat transfer. The tubes extend lengthwise through the heater section and terminate in tube sheets. The fins lie in lines paralleling the general path of the air in flowing through openings into the heater, the air thence being discharged just below the grate. With this arrangement all of the air for combustion purposes must pass through the preheater, thus raising the temperature before it reaches the fire bed.

There is an opening between the two heater sections and also at each corner below the mud ring, which are normally closed by doors. These openings provide access to the ashpan for cleaning.

Steam is circulated through the heater sections, each of which operates separately. When the locomotive is in operation the steam is taken from the exhaust passages of the cylinders and carried direct to the air preheater units. When the steam is shut off from the main cylinders and the locomotive is drifting or standing, the steam is taken from the main turret and passes through a reducing valve which reduces the pressure to 15 lb. per sq. in. before it passes through the lines to the preheater units. The change from the use of exhaust to live steam and vice versa is automatically accomplished by valves of special design. When the steam is being admitted to the main cylinder the valve in the line closes the live-steam connection from the turret and the automatic valve in the line from the cylinders to the preheater unit is opened, thus permitting the passage of



View of a 2-10-4 Locomotive Equipped with the Firebox Preheater

exhaust steam. When the steam is shut off from the main cylinders this operation is reversed.

The steam is led to the back end of each heater section. All of the heater tubes are constantly filled with steam; the inflow of air around the tube condenses the steam, causing it to give up its heat. The condensate is led to a trap and discharged to the ground, or may be led, by suitable means to the water space in the tender, if this is desired.

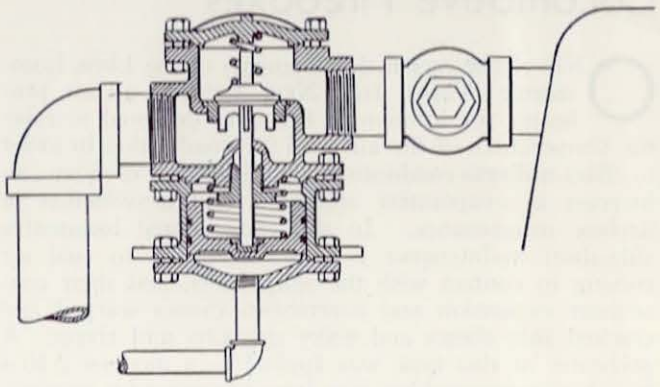
Shut-off valves are applied so that the heater can be made inoperative without interfering with the operation of the locomotive. A blower fitting is provided in the line from the turret so that steam can be applied to the heater when the locomotive is being fired up. The entire arrangement is automatic in operation and requires no attention on the part of the engineman. Each of the heater sections is so designed as to be interchangeable. The preheater arrangement is covered by pending patent applications.

Automatic Drifting Valve

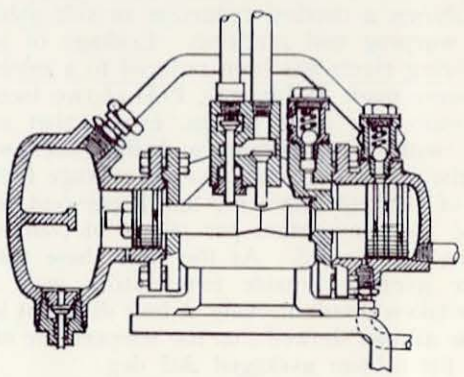
AN improved type of automatic drifting valve, known as Model 10A, has been developed by the Ardco Manufacturing Company, Hoboken, N. J. In this design the drifting-valve proper is operated by air pressure through the medium of a separate control valve being governed by the opening and closing of the cylinder cocks.

When the cylinder cocks are closed air is admitted from the main reservoir to a pipe leading to the control valve. The air-pressure keeps the inlet (right-hand) valve closed, while the piston rod holds the exhaust bracket (left-hand) valve open. In this position the drifting valve is closed. When the throttle valve is opened some of the steam in the main steam pipe *A* passes through branch pipe *B* into the cylinder at the right-hand end of the control valve, causing the piston to move to the left and uncover the port which allows steam to lift a ball check and pass through a pipe into the chamber at the left-hand end of the control valve. The right-hand piston being larger than the left-hand piston, the piston stem holds open a small valve and connects the bottom of the drifting valve to the atmosphere, thus permitting the drifting valve to remain in closed position.

When the throttle valve is closed steam in the right-hand chamber of the control valve is exhausted through branch pipe *B* and steam is trapped in the left-hand chamber by a non-return check valve. The pistons are thus moved to the position shown in the cut. In so doing an inlet valve is opened by the piston rod and the outlet valve closed so that air will pass to the underside of the piston and the drifting valve, causing it to move up and thus open the drifting-valve proper against boiler pressure which is on top of the check valve.



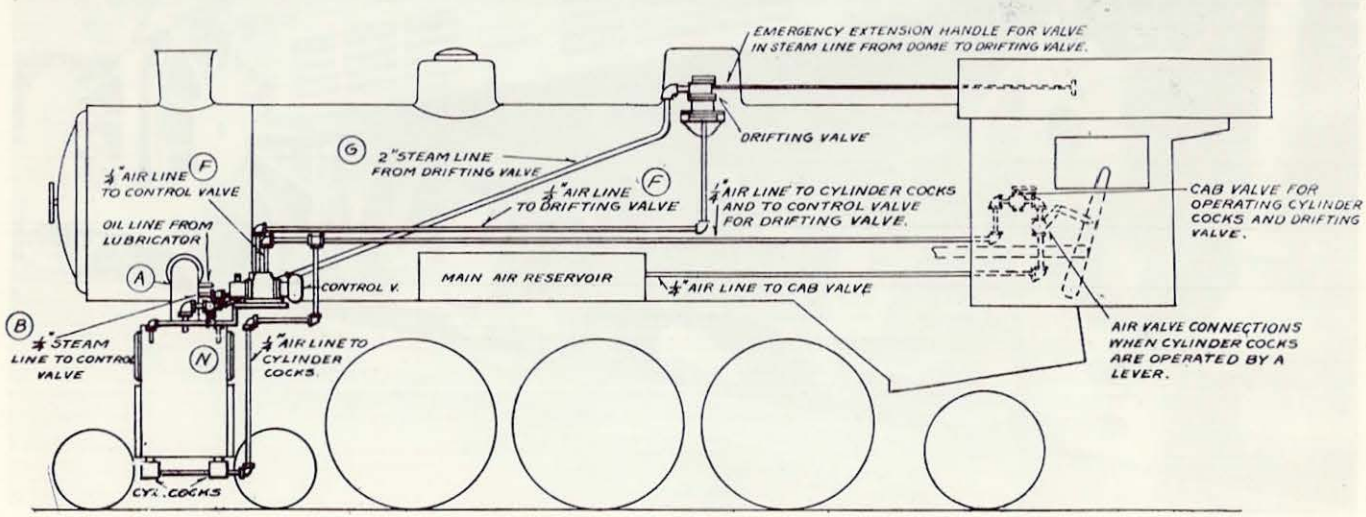
The Ardco Drifting Valve Model 10-A



Control Valve for Ardco Drifting Valve

Steam is now free to pass directly from the dome to the locomotive steam chest and cylinders.

As the locomotive slows down preparatory to stopping the amount of steam supplied to the locomotive steam chests and cylinders by the drifting valve is greater than can be worked off by the slow-moving valves and pistons. As a consequence pressure builds up in the steam pipe *A* and branch pipe *B* and back of the large piston of the drifting valve. This causes the differential pistons in the control valve to move to the left,


EMERGENCY EXTENSION HANDLE FOR VALVE IN STEAM LINE FROM DOME TO DRIFTING VALVE.
DRIFTING VALVE
G 2" STEAM LINE FROM DRIFTING VALVE
¼" AIR LINE F TO CONTROL VALVE
¼" AIR LINE F TO DRIFTING VALVE
¼" AIR LINE TO CYLINDER COCKS AND TO CONTROL VALVE FOR DRIFTING VALVE.
CAB VALVE FOR OPERATING CYLINDER COCKS AND DRIFTING VALVE.
OIL LINE FROM LUBRICATOR
A
CONTROL V.
MAIN AIR RESERVOIR
¼" AIR LINE TO CAB VALVE
B ¼" STEAM LINE TO CONTROL VALVE
N ¼" AIR LINE TO CYLINDER COCKS.
AIR VALVE CONNECTIONS WHEN CYLINDER COCKS ARE OPERATED BY A LEVER.
CYL. COCKS

Application of the Ardco Drifting Valve and the Control Valve

thus permitting the piston stem to open the exhaust valve leading from the lower chamber of the drifting valve to the atmosphere, thereby allowing the drifting-valve proper to close.

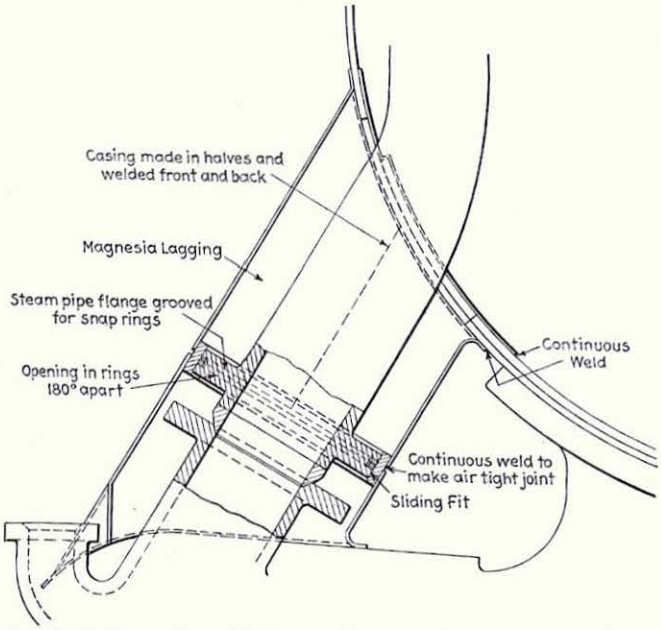
When the engine is placed in a terminal and cylinder cocks opened, air pressure to the drifting valve is automatically shut off and the drifting valve becomes operative. An emergency globe valve controlled by an extension handle is located between the dome of the boiler and the drifting valve. This is designed for use in emergency only.

Reid Casing for Locomotive Steam Pipes

THE purpose of the Reid steam-pipe casing designed by the Lima Locomotive Works, Inc., is to prevent the admission of air to the smokebox through the opening around the steam pipe and, in doing this, to provide ample flexibility, thus obviating any tendency for the casing to pull away from its connections.

Referring to the illustration, it will be noted that the opening in the smokebox around the steam pipe is closed by a plate liner which fits closely around the pipe and is welded continuously around its outside edge to the inner face of the smokebox shell.

Cylindrical casings encompass the steam pipe. One of these casings extends from the smokebox to a point adjacent the steam-pipe flange. The upper end of this casing is flanged and welded to the outer face of the smokebox shell, while the lower end is welded to a steel casing ring. This ring encircles the steam-pipe flange and is bored just sufficiently larger than the finished flange to secure a sliding fit over it. A groove is formed around the steam pipe flange to receive two snap rings. These snap rings, with joints spaced 180 deg. apart, expand outwardly against the casing ring, thus effectively establishing an air-tight joint. Within this casing the steam pipe may be lagged with magnesia or other heat-resistant material to lessen the radiation of heat from the steam pipe. As will be noted from the illustration, the casing is made in halves and welded on the front and back sides to facilitate application.


Casing made in halves and welded front and back
Magnesia Lagging
Steam pipe flange grooved for snap rings
Opening in rings 180° apart
Continuous Weld
Continuous weld to make air tight joint
Sliding Fit

The Reid Steam-Pipe Casing Provides for Expansion and Assures Freedom from Air Leakage to Smokebox

A lower section of casing is also provided. This portion of the casing extends from the steam-pipe flange casing ring to the valve chest on the cylinder.

From this description it will be seen that, in addition to an air-tight closure for the smokebox, a positive means is provided for taking care of expansion and contraction as well as vibration of the locomotive. This is accomplished through the casing ring, the inside face of which is arranged to slide freely on the steam-pipe flange.

While the illustration shows the flange of the steam pipe as designed to suit application of this casing, on engines already built where the steam-pipe flange is not similarly formed it is usually possible by a slight modification in the arrangement to use the existing steam pipes.

Patent applications are now pending on the Reid steam-pipe casing arrangement which was used on the Pacific type locomotives recently built by the Lima Locomotive Works, Inc., for the Boston & Maine.

Some Recent Air-Brake Developments

SEVERAL developments in various details of air-brake equipment for locomotives, passengers cars and freight cars have recently been made by the Westinghouse Air Brake Company, Wilmerding, Pa. Among them is a new empty-and-load-brake for freight cars, a new gasket for the Universal valves, and a steam drain valve for air compressors.

Automatic Empty-and-Load Brake

This is a new form of empty-and-load brake, with automatic change-over feature for freight cars having a high ratio of load to total weight. The standard AB equipment is used with a new 8-in. "empty" cylinder and a 16-in. "load" cylinder. A change-over valve (attached to the AB valve pipe bracket) is provided to direct the flow of air from the AB valve to one cylinder when the car is empty and to both when it is loaded.

The change-over valve is automatically set for one condition or the other by means of an operating mechanism, the relative position of which depends upon the truck-spring deflection as determined by car loading.

A strut rod connected to the spring plank extends upward to contact a registering arm fastened to the car body. An extension of this arm is attached to the piston of a strut cylinder. During the initial charging of the equipment, up to a predetermined pressure, air is admitted to the strut cylinder. Its piston then moves downward, carrying the registering mechanism to a position determined by the height of the strut rod. When the car is empty the car body "rides high" and the strut-cylinder piston can go to its extreme low position. When the car is loaded the body is lower relative to the truck-spring plank and, consequently, the strut-cylinder piston can not move down so far. In the former position the change-over valve parts are moved to a position suitable for empty car braking and, in the latter position, for loaded car braking. After this is accomplished and the pressure in the brake system continues to build up, air is exhausted from the strut cylinder to lift the operating mechanism out of contact with the strut rod. There is, therefore, no wear from vibration nor possibility of false

changes in setting while the car is moving over the road. Coincident with this operation the change-over valve is locked in the adjusted position, whichever it may be.

When the change-over valve is set for empty-car operation, air from the AB valve is directed to the empty cylinder only. When set for loaded car operation, air is first directed to the empty cylinder until a certain pressure has been built up sufficient to bring the brake shoes firmly against the wheels, whereupon air is also admitted to the load cylinder which is of the usual form with notched push rod and clutch mechanism.

Since the piston movement of the load cylinder is very short, the combined cylinder volume in this equipment is the same as that of the standard 10-in. single-capacity brake, and the proper cylinder pressures are, therefore, obtained for given brake-pipe reductions.

The outstanding feature of this brake is the automatic control of the empty or loaded position, eliminating the normal operation necessary with all previous forms of empty-and-load brake used in freight service. The air consumption is no greater than with the standard 10-in. single-capacity brake.

Wabco Gasket for Universal Valve

An improved form of Wabco gasket for the application-and-release-piston covers of the universal valve which prevents bulging, sometimes caused by excessive or uneven compression, should the bolts be tightened improperly. The improved gasket is of a double-composition form with the center material relatively soft to provide a tight seat and the surrounding material somewhat harder so as to withstand distortion. Metal inserts are molded in the gasket around the bolt holes to limit the gasket compression.

Steam Drain Valve for Air Compressors

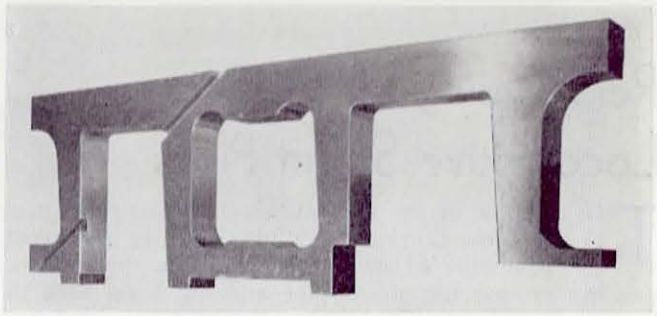
A steam drain valve to be used in place of the common form of plug type drain cock has now been developed. This valve is of the poppet type with a metal-seated valve held closed by steam and spring pressures, and open by a lever-type handle and cam-operating shaft. While designed primarily for use on steam-driven air compressors operating on high-steam pressure, this device is applicable wherever a leak-resisting drain device is required.

Rolled Steel Frames for Locomotives

MODERN methods of flame cutting make it possible to produce locomotive frames from rolled-steel slabs that will insure uniformly solid and homogeneous materials throughout. Slabs rolled to the required thickness and width are placed on a pantograph machine and the general contour of the frame flame cut to within ⅛ in. of the finished dimensions, after which the frame is annealed to insure against any detrimental effects from the cutting. By this method it is possible to produce a rough frame much closer to the finished dimensions than can be furnished in a cast frame and, accordingly, the amount of machining necessary to finish the frame for application is materially reduced.

The illustration shows a section of the slab-cut frame, 6 in. wide and 31⅛ in. deep, which was prepared for test and exhibition by the subsidiary manufacturing companies of the United States Steel Corporation.

Test pieces were cut from the lower part of the right-hand pedestal which showed a tensile strength of 63,000 lb.; yield point, 33,250 lb.; elongation in 2 in., 36 per cent; reduction of area, 57.3 per cent—being well within the A.S.T.M. specification 113-33, to which it was ordered. This specification calls for tensile strength of 55,000-65,000 lb.; yield point, one half the ultimate; elongation in 2 in., 22 per cent. The transverse cuts through the left-hand pedestal were made to show the solidity of the metal at a point where blow-holes are apt to occur in a cast frame.



A Section of a Rolled-Steel Slab Locomotive Frame

The outstanding advantage in a rolled-steel slab frame is the insurance against failure due to shrinkage cracks and blow-holes often existing in castings. The cost of the rolled-steel frame is said to compare favorably with the cast frame.

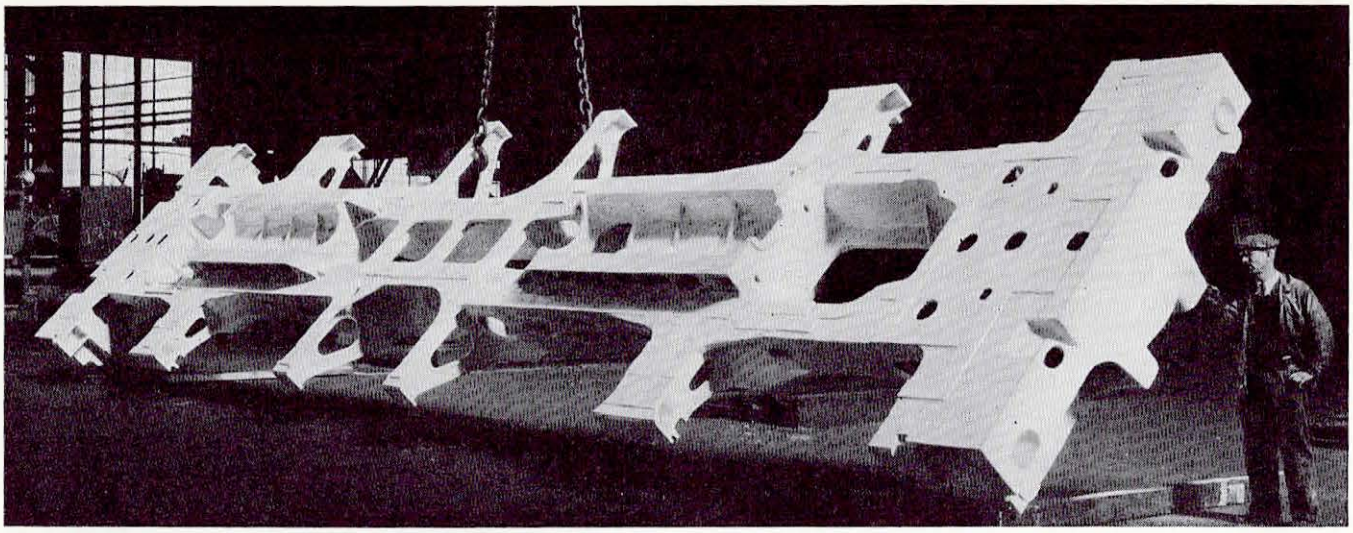
Rolled-steel slab frames can be made to meet any physical requirements desired. If the higher tensile steels, heat-treated after cutting, are used, a reduction in section of from 10 to 15 per cent could be made from the ordinary cast-steel frame with a corresponding reduction in weight.

Diesel-Electric Cast Steel Cab Underframe

THE cast steel cab underframes, recently furnished by the General Steel Castings Corporation to the Westinghouse Electric and Manufacturing Company for 115-ton Diesel-electric 800-hp. locomotives, are similar in general design to cast steel cab underframes previously furnished various companies for Diesel-electric locomotives, but contain several new features.

The locomotive itself is of a double power-plant type, utilizing two Westinghouse Type-4-E-2 six-cylinder 400-hp. Diesel engines, operating at 900 r.p.m., delivering power to the wheels by electrical transmission. The generator equipment of the locomotive consists of two Type-477 standard railway Class-B insulation single-bearing generators. The traction motors are Type-360 standard railway series, Class-B insulation, force-ventilated. The locomotive has a starting tractive effort of 69,000 lb. with 30 per cent adhesion, and a continuous tractive effort, operating at 10.2 m.p.h., of 23,000 lb. The maximum safe speed is considered to be 45 m.p.h. All the locomotive weight is on the drivers.

The new features which have been incorporated in the cab underframe are as follows: The end sills have been utilized as sand boxes with two filling holes located one on each side of the longitudinal center line, these holes



Cast Steel Cab Underframe for Westinghouse 115-Ton Diesel-Electric Locomotive

being readily accessible to the operating crew from the ground, and having a direct connection from the under side of end sills for sanding rails.

The blowers for the traction motors are located on the finish pads immediately at the rear of the end sills, and air is transmitted to the motors through the box-section main center-sill members extending from the end sills to the bolsters, thus eliminating the use of auxiliary air ducts.

The generator is mounted directly on the underframe on the two finish pads located on top of the box-section construction mentioned above. The Diesel engine is mounted directly on the underframe which incorporates the engine crank case, as well as the engine lubricating oil reservoir. This reservoir is located immediately under the engine crank case portion and is separated therefrom by cover plates which are held in place by tap bolts. These compartments were thoroughly cleaned in the course of manufacture, the cored openings closed with ¼-in. plates welded in place, and the complete interior painted with a special spirit enamel in accordance with Westinghouse specifications.

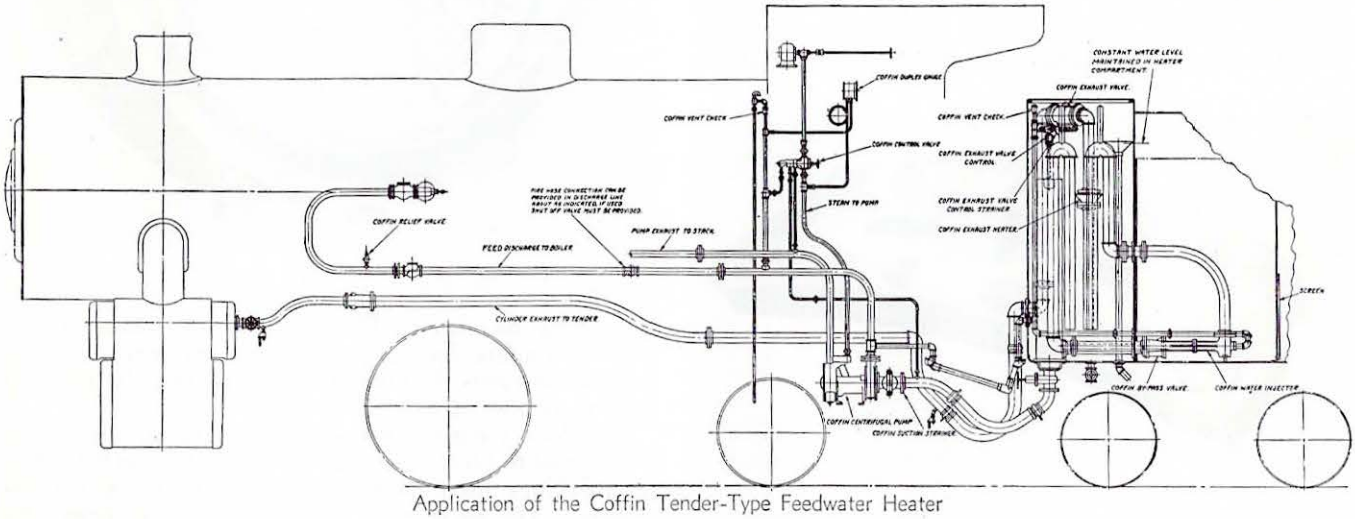
While the fuel-oil reservoirs used with this underframe consist of separate tanks, the General Steel Castings Corporation have since furnished an underframe for a 1,600-hp. Diesel-electric locomotive in which the fuel reservoirs are cast integral, and this feature may also be included in future underframes of this type.

The cab structure of the locomotive is supported directly on the underframe and a special contour has been provided at the ends of the end sills, bolsters and needle beams to accommodate a 10-in. channel which forms the side sill of the cab structure. The draft-gear pockets of the underframe are arranged with two key slots located 3 in. apart in the vertical position, this being done to permit interchanging underframes for either 44-in. or 38-in. wheels.

Tender-Type Feedwater Heater

THE tender-type feedwater heater recently developed by the J. S. Coffin, Jr., Company, Englewood, N. J., is simple in construction and operation. There are no moving parts to become inoperative on account of scale formation; no high-pressure steam connection is used between engine and tender; no float mechanism is employed; no mechanical temperature control is required for normal operation. To insure against abnormal conditions, however, an exhaust valve, with maximum temperature control, is provided. This is essential to dependable pump operation in an open type feedwater heater.

Cold water from the main tank is discharged near the bottom of the heater compartment by means of the



Application of the Coffin Tender-Type Feedwater Heater

Coffin water injector, which is operated by water pressure from the pump discharge line. Exhaust steam from the locomotive cylinders enters the heater compartment through the Coffin exhaust valve and passes to the exhaust heater. The exhaust heater draws cool water from the bottom of the compartment and mixes it with the exhaust steam.

The proper proportion of exhaust steam and water is automatically maintained by the heater to give dependable feedwater temperatures under normal operating conditions without thermostatic control. This permits the use of smaller exhaust steam piping than is required where thermostatic control is used.

The hot water is discharged by the exhaust heater in an upward direction near the top of the heater compartment. The compartment is designed to maintain the hottest water at the top, from which point the feedwater to the pump is drawn. This results in instantaneous hot water at maximum practicable temperatures, a new principle in locomotive feedwater heating.

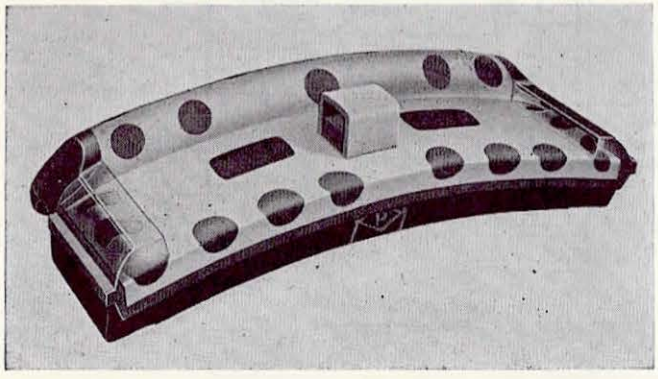
In cases where the boiler is fed intermittently the heater compartment acts as a hot-water storage space, the water heating progressively from top to bottom.

Water is maintained at a constant level in the heater compartment, by means of an overflow which returns cool excess water to the suction of the water injector.

In addition to the familiar form of Coffin front-end exhaust-steam feedwater heater—now known as Style 1—a new form—known as Style 2—is now available. The Style 2 system is so designed that the feedwater heater forms an integral part of the locomotive boiler. Whereas in the Style 1 the heater unit is furnished complete inside a casing, in the Style 2 only the assembled heating tube bundle is supplied ready to be mounted in the smokebox recess which forms the heater casing.

Reinforcement for Driver Brake Shoes

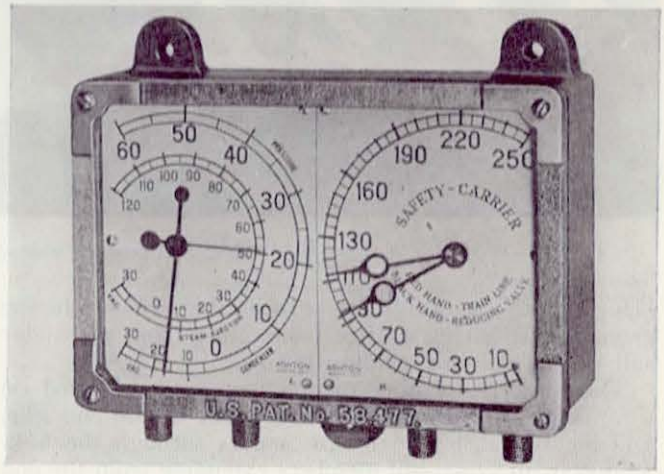
THE Samson steel-back reinforcement for driver brake shoes, recently developed by The American Brake Shoe and Foundry Company, New York, is an important improvement in brake-shoe construction. This steel back is so designed as to better the anchorage of the body metal of the shoe under the severe braking service of present-day high speeds and heavy loads and to hold the metal in place for more efficient and economical service. Driver brake shoes with Samson steel-back reinforcement have already been adopted as standard by many railroads in the United States and Canada.



Driver Brake Shoe with Samson Steel-Back Reinforcement

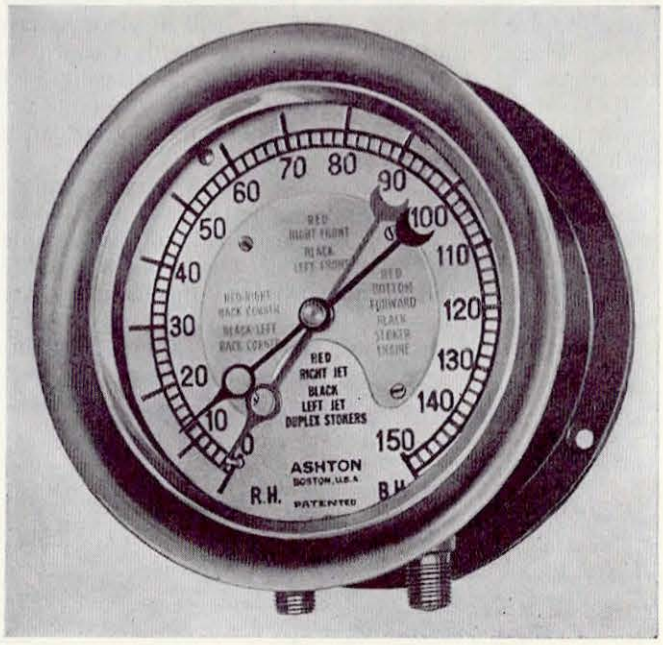
Gages for Air-Conditioning and Stoker Engine Service

AMONG the recent developments of the Ashton Valve Company, Boston, Mass., are the two gages shown in the illustrations accompanying this article. One of the gages shown is a 5-in. rectangular-case gage in which the working units of four gages are



Ashton 5-In., No. 62QD Rectangular-Case Gage for Use with Air-Conditioning Systems

combined in one case. These gages are used in connection with the Safety-Carrier air-conditioning system. The working mechanism is contained in a heavily constructed brass case provided with substantial bolting lugs which insure security and proper alinement to the



Ashton 5-In. 62BU Circular Gage for Locomotive Stoker Engines

supporting members. This construction makes it possible to combine four gages into one unit with economy in space and aids the operator in visualizing the pressure reading of the various units of the system.

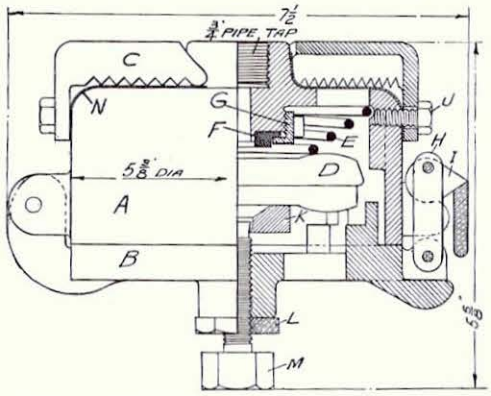
The 5-in. circular gage shown in another illustration is designed to meet the requirements of the various service markings used on the several types of locomotive stokers. The cover plate may be rotated to reveal the

proper service markings applicable to the particular stoker on the locomotive to which the gage is applied. By the use of this quadruple-dial marking it is possible to reduce the number of gages which it is necessary to carry in stock. This same principle is applicable to Duplex air-brake gages where various service markings are also required on different equipment.

High Pressure Steam Trap

THE Gold Car Heating & Lighting Company, Brooklyn, N. Y., has recently placed on the market a high-pressure steam trap for use with air-conditioning equipment which will take care of emergency steam pressure up to train-line pressure.

Due to specially designed ventilators shown at *C* in the upper portion of the diagram accompanying this article, the action of the diaphragm is speeded up, causing immediate and complete discharge of condensation, thus securing dry steam and effective heat.



Sectional View of Gold High-Pressure Steam Trap With ¾-In. Connection

In some types of air-conditioning equipment overhead steam coils are located in the bulkheads of each car, which coils must be drained of condensation. In operation these coils carry low pressure steam generated by an automatic control. Should ever an emergency arise causing full train-line pressure to be delivered to these coils, means must be provided to care for the condensation at high pressure. These traps are for this purpose.

Cork Base Filler for Car Floors

CORK base, made by the Armstrong Cork Company, Lancaster, Pa., is a new product for use as a filling agent in railway passenger car floor construction. This new material, which is a highly compressed board manufactured from granulated cork and which closely resembles cork tile, was developed primarily for the purpose of producing a smooth surface on uneven metal decks or floors for the application of a finished floor of linoleum, rubber tile, cork tile, and other types of floor coverings.

Cork base is particularly adaptable for use as a filling agent where floor plates of the Keystone design are installed. To fill the channels properly strips of suitable dimensions in thickness and width are cut to 36-in. lengths for this application. Slabs of cork base are obtainable in any thickness from ⅜ in. up to and including 1⅜ in., in boards 12 in. by 36 in.

Cork base reduces the weight of the floor from three to five pounds per square foot and also provides added resiliency without detrimental indentation. The thermal conductivity in B.t.u. per square foot, per inch thickness, per degree difference in temperature, per hour, ranges from 0.38 to 0.42. This insulation value is particularly desirable for air-conditioned equipment.

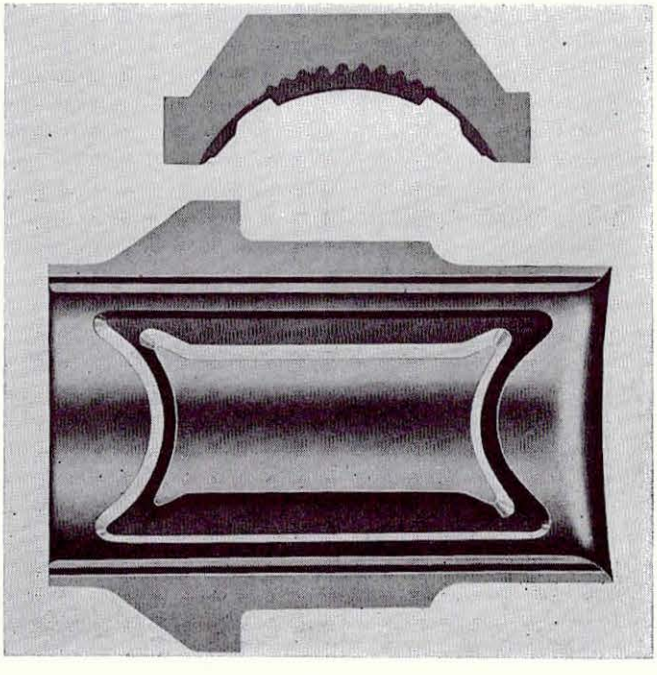
No artificial binder being used in the manufacture of Armstrong cork base, it is, therefore, non-hydroscopic; it is little affected by extreme variations in humidity, and it is claimed that it will not dry out and shrink with age. This is an important feature, as any cracks that develop in a sub-floor eventually show through the finished surface.

Improved Journal Bearing

AN improved design of journal bearing, said to eliminate waste grabs which cause 80 per cent of all hot boxes and journal-bearing failures, has been developed by the National Bearing Metals Corporation, St. Louis, Mo. The Security-Bond Oil-Control journal bearing, as it is called, is made in seven sizes, from 3¾ in. by 7 in. to 7 in. by 14 in., being provided with longitudinal channels or pockets and projecting lugs which retain a portion of the oil, distributing it over the length of the bearing. These channels also serve as traps for lint and waste particles which, in the conventional type, form the source of waste grabs or wipers, robbing a portion of the bearing of its proper lubrication.

The circular connecting grooves, shown in the illustration, by-pass the excess oil, providing uniform lubrication of the entire bearing surface and assuring proper distribution of the oil in the packing. That this result is accomplished is indicated by the equal drippage of oil from each side of the bearing.

The Security-Bond bearing is designed to overcome the development of cracked or loose linings in journal



Security-Bond Oil-Control, Journal Bearing

bearings. Small particles of waste which are caught between the bearing surface and serve as an oil wiper are often consumed by the heat created, but the damage has already been done. The heat breaks the bond between the lining and the journal and subsequent wear and vibration cause this loose area to check crack, allowing the oil to run through under the lining instead of supplying the journal surface of the bearing beyond the crack. In order to correct this condition, the bonding area of contact has been increased by designing serial corrugations running the length of the load-carrying area of the journal. The babbitt metal is interlocked with these corrugations, affording a semi-vertical as well as a radial bond, thus reducing the stress due to the difference in expansion of babbitt metal and bronze. The increased bonding area also permits quicker transfer of frictional heat to the bronze, utilizing to the full extent the known superior heat-conducting qualities of this metal.

The design of the Security-Bond Oil-Control bearing, by eliminating many causes of failure in the conventional type of plain bearing, tends to promote increased bearing life. It is said that in exhaustive tests of machines with 100-per cent overload, as well as by actual service tests on many cars, locomotive trucks, trailers, and tenders, these bearings have continued to operate without trouble far beyond the mileage given by the bearings they replace. A number of railroads have used this bearing continuously since January, 1933.

The Miner Lock Yoke for Butt Couplers

THE Miner coupler lock yoke, as illustrated, has been developed to replace wrought-iron yokes on cars equipped with 8½-in. and 9⅛-in. butt couplers without key slots. The device is made in two sizes in order to accommodate 18½-in. or 24⅝-in. draft gears.

This yoke is designed to meet all physical requirements of the A. A. R. key-connected yoke. The item of most importance, however, is the fact that this special yoke is readily interchangeable with the wrought-iron

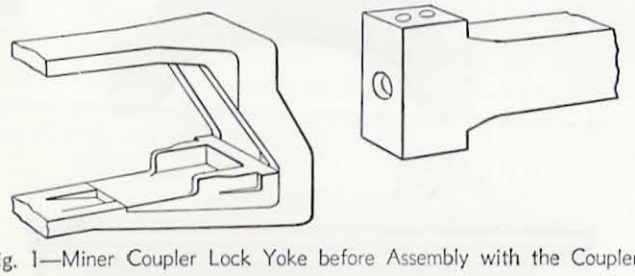


Fig. 1—Miner Coupler Lock Yoke before Assembly with the Coupler

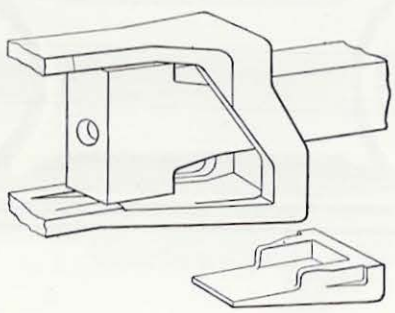


Fig. 2—Coupler Applied Ready for Application of the Lock Casting

design, requiring no changes whatever in the coupler butt. It eliminates the use of rivets and, in doing so, provides a flexible connection to the coupler. It is adaptable to either the 8½-in. or 9⅛-in. coupler butts, and the method of assembly is clearly illustrated.

The shouldered coupler butt, shown in Fig. 1, does not require burning, chipping or any other modifications before it is assembled to the yoke. The method of assembling the coupler is a simple process. The coupler

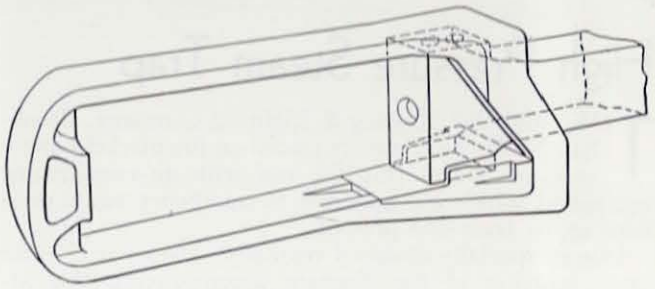


Fig. 3—Miner Coupler Lock Yoke with Coupler in Place Ready for Application of the Draft Gear

is inserted into the front opening in the yoke to the position indicated in Fig. 2, the lock casting is then placed in its recess in the front end of the yoke and the coupler is pulled forward until the shoulders engage the two substantial abutments provided by the yoke casting and coupler lock. The complete assembly of yoke, yoke lock and coupler is shown in Fig. 3.

An important mechanical advantage, found in this design of yoke only, is the strength and flexibility of the connection. During all buffing shocks, the coupler moves rearwardly against the follower plate and transmits the load directly to the draft gear, permitting the yoke to remain stationary, while in most key-connected devices the damaging blows are transmitted through the connecting means to the yoke casting, thereby causing considerable wear and damage to this most important member.

The yokes are produced of special heat-treated steel which makes them unusually tough and wear-resistant.

Non-Adjustable Diaphragms for Steam Traps and Regulators

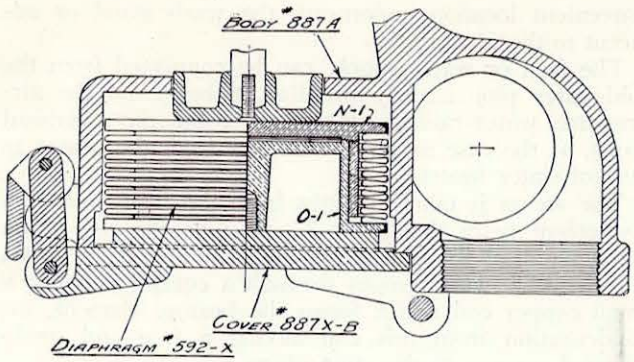
THE Gold Car Heating & Lighting Company of Brooklyn, N. Y., has recently developed a non-adjustable diaphragm for steam traps and vapor regulators to handle pressures up to 200 lb. without the necessity of making adjustments.

Changing conditions have made it necessary for railroads to increase the length of passenger trains and a consequent increase in car heating steam pressure has been necessary in order to assure the proper heating of the rear cars of long trains.

In applying this non-adjustable diaphragm to existing regulators it is necessary to use a new cover, a change in the design of the cover having been made necessary by the construction of the non-adjustable diaphragms.

The diaphragm is an accordion shaped bellows formed by collapsing dies that form each convolution without expanding the metal, producing a bellows having the same thickness of metal throughout its entire length.

The diaphragm has a natural resilience of ⅝ in. which



Section of Cold Vapor Valve with Non-Adjustable Diaphragm

means that it can expand that amount without distortion. Ordinarily only about ¼ in. of motion is necessary so that this assures that the bellows will not become inactive through metal fatigue.

The diaphragms are normally in the collapsed position being compressed by a vacuum and hermetically sealed.

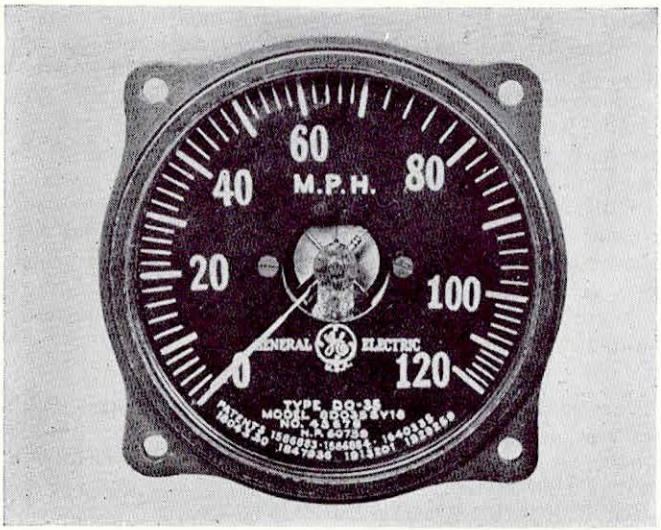
Due to the fact that the volatile liquid is located in the outer portion of the diaphragm only and due to the flexibility of the bellows the diaphragm is extremely sensitive. Notwithstanding this fact is has great power to close against 200 lb. steam pressure.

Electric Speedometer for Locomotives or Cars

A NEW type of electric speedometer, developed by the General Electric Company, was used on the Burlington, Union Pacific and some other recent streamlined trains.

The generator of this new speedometer is an alternator with a permanently excited field, and the indicator operates in direct proportion to the frequency. No specially calibrated circuit wires are required and there are no generator brushes or commutator, thus insuring long life and minimum attention. All leads are totally enclosed, the bolted terminal connections are easily reached, and the single generator ball bearing can be greased during annual inspection. The generator is keyed to, and driven direct from, the end of the axle, eliminating belts, pulleys and gears. The transformer resistor box is calibrated for the desired drive-wheel diameter and contains a manual adjustment to compensate for wheel wear.

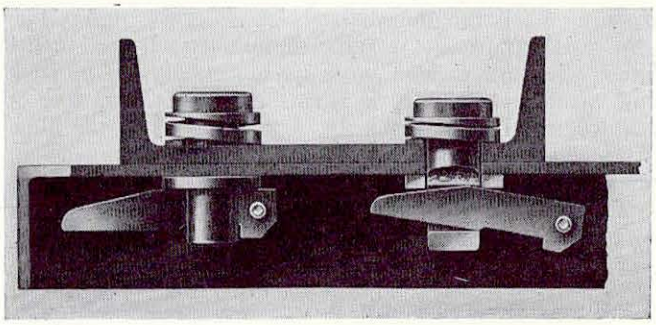
The indicator has a black dial with white markings, to eliminate glare. The scale, covering from 0 to 120 m.p.h., extends over a 270-deg. scale. To install the equipment it was necessary only to provide a journal box cover for mounting the generator. The transformer resistor box is mounted in the car body.



Indicator of the General Electric Speedometer

Fastener for Brake-Beam Supports

THE Buffalo "Security Fastening" has been developed by the Buffalo Brake Beam Company, New York, as an addition to its line of brake-beam supports. This device is easily applied and serves as an effective means for securing safety angles to the spring



Buffalo Security Fastening for Holding Brake Beam Supports

plank of the truck. As will be noted from the illustration the conventional brake-rigging pin is employed with an absorption spring and a double-locked split key of unique design. This fastening affords a means of using reclaimed angles or other suitable shapes for brake-beam safety supports.

Reclining Back Seats for de Luxe Cars

THE reclining-back chair shown in the illustration is typical of several designs for de luxe coaches recently developed by the Heywood-Wakefield Company, Gardner, Mass. The chair mechanism of the type described is built up on two aluminum angle rails supported on the aisle end by a polished aluminum pedestal and on the wall end by malleable iron brackets. The rotating feature of the mechanism, actuated by two links, causes the chair to draw away from the wall before the actual revolving is started. Malleable iron castings are used in the major portion of the mechanism. The ratchet-reclining mechanism is concealed in the arm rests which make up a part of the chair framing, and it is sheathed by upholstered steel panels. The reclining of the backs is accomplished by pressing the thumb latches and exerting pressure on the individually controlled backs which can be reclined from 20 to 40 deg. A compression spring returns the backs to a normal

Heywood-Wakefield Type 176 P2SS Reclining Back de Luxe Coach Seat

position when the thumb latch is again released. The arm caps are usually Bakelite or upholstered and, in the latter case, are padded with sponge rubber. The back and cushion upholstery is furnished to suit a variety of requirements. The particular design shown in the illustration has an overall length of 43 in., an overall height of 39 in., and a cushion height above the floor varying from 13½ in. at the rear to 17 in. at the front. The weight of this type is 160 lb.

Hot Water Heaters for Passenger Cars

ONE of the recent developments of the Gold Car Heating & Lighting Company, Brooklyn, N. Y., is a heater for supplying hot water to washbasins in passenger cars. The heater is so designed that it will supply hot water at a predetermined temperature without the aid of additional apparatus—no additional vapor regulator being necessary.

It is designed to be installed in a vertical position in a convenient location underneath the wash stand or adjacent to the wash room.

Cold Water Heater for Passenger Car Use

The feed or water supply can be connected from the cold-water pipe already installed, either from the air-pressure water-raising system or from the overhead tanks, as the case may be; then run from the heater to the hot-water faucets.

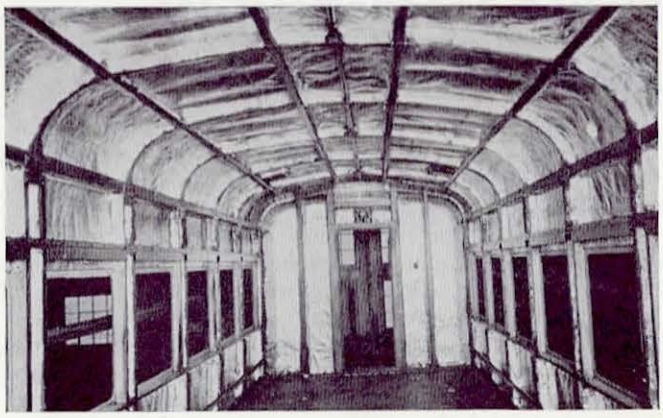
The steam is taken directly from the train line at a convenient point through a ½ in. pipe the connection being made at the top of the heater. The steam when entering the heater passes through a control valve to a small copper coil which forms the heating element, the condensation from this coil having a free and unobstructed passage to the atmosphere.

The temperature of the water leaving the water chamber to the hot-water faucets is controlled at any predetermined temperature by a thermostat within the heater.

Nicolfelt Insulation

ONE of the recent developments in insulation of steel or aluminum passenger cars is a product known as Nicolfelt, developed by the George A. Nicol Corporation, New York.

Nicolfelt is a combination of hair felt and paper-backed aluminum foil, adhesively united, and available



Application of Nicolfelt to a Railroad Coach

in thicknesses of 3/16 in., ¼ in., ½ in. and ¾ in. This material utilized the well-known insulating properties of standard hair felt, plus the highly reflective properties of aluminum foil in retarding heat transmission through the walls of a passenger car. The waffle side of the hair felt is cemented against the panels of the car body with the aluminum foil surface exposed on the inside of the wall space.

This material, in addition to its insulating properties, is said to be highly efficient in absorbing sound and eliminating the vibration of the metal sheets to which it is cemented.

Nicolfelt has been used on a number of the recently built streamlined passenger trains.

PASSENGER TRAFFIC ON THE GERMAN RAILWAYS increased ten per cent in 1934 as compared with 1933, according to recent reports received by the U. S. Department of Commerce. A total of 1,359,600,000 passengers were carried last year as compared with 1,240,500,000 in 1933. The average journey per passenger in 1934 was 25.6 kilometers as compared with 24.3 kilometers in the previous year.

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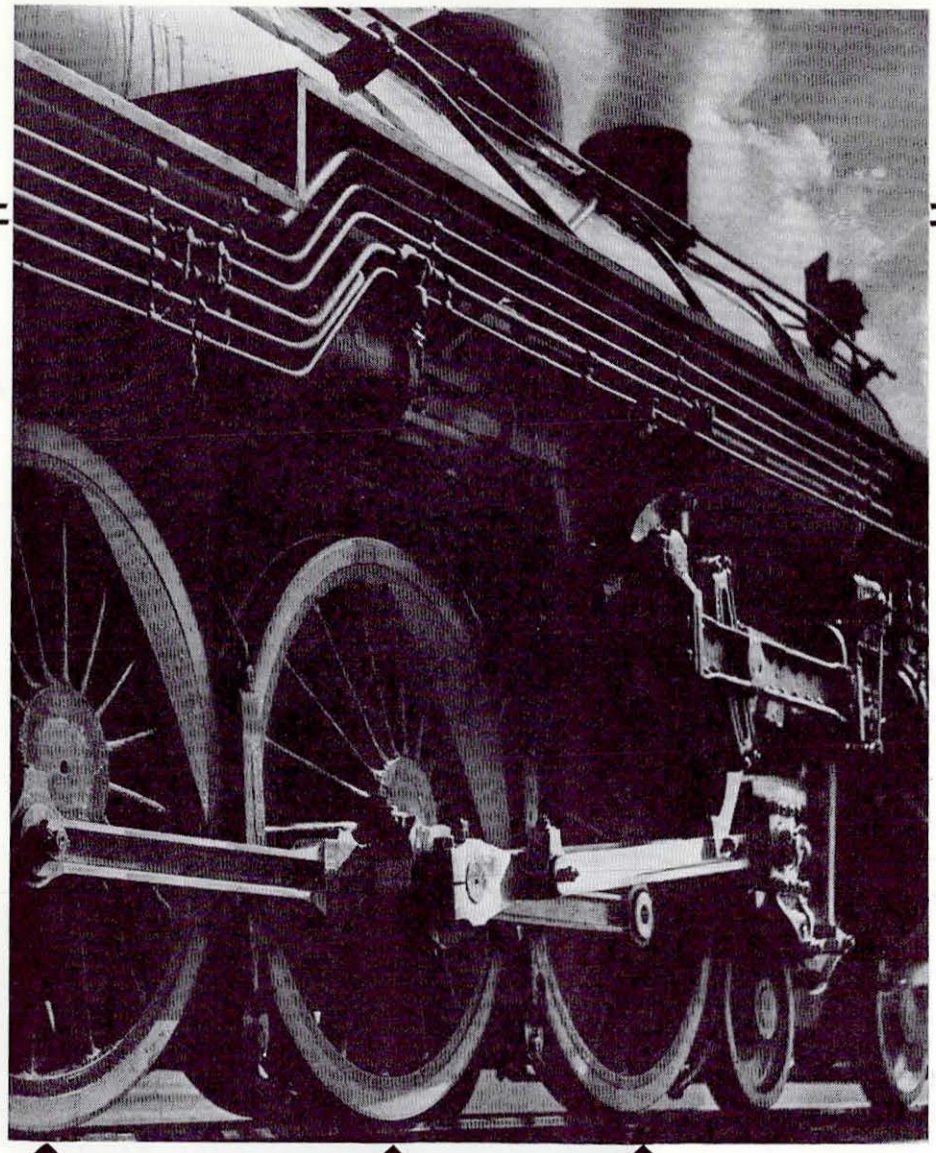


THE "POWER POINTS" » » » Where

the locomotive turns its power into gross ton miles per train hour. » » » Modern locomotives apply 1200 horsepower at each "power point", most locomotives ten years old and over apply only 600. » » » Twice the power applied at these points produces twice the drawbar horsepower. » » » Twice the drawbar horsepower produces twice the gross ton miles per train hour.

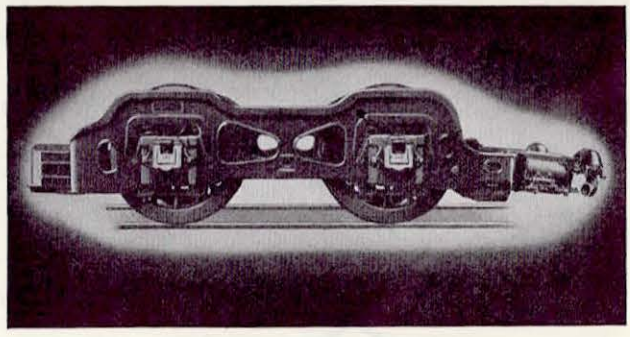
LIMA LOCOMOTIVE WORKS INCORPORATED

LIMA LOCOMOTIVE WORKS, INCORPORATED, LIMA, OHIO

4 ESSENTIALS

FREIGHT AND PASSENGER OPERATION NOW REQUIRE TYPES OF MOTIVE POWER THAT PROVIDE:

1. Greater efficiency in starting.
2. Rapid acceleration to road speeds.
3. Assistance for grades—or any tight places.
4. Ability to make long fast runs without terminal attention.

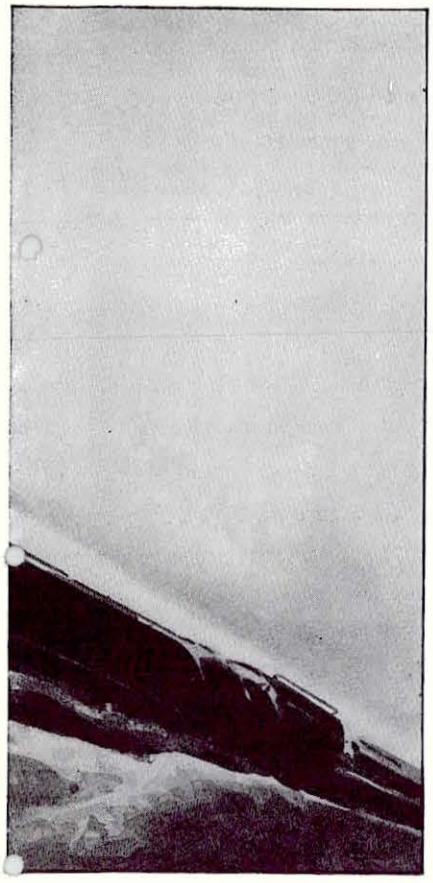


REG. U.S. PAT. OFF.

FRANKLIN

NEW YORK

FOR *Successful* LOCOMOTIVES



The future operation of successful railroads will no doubt be based on the proper solution of this problem with a minimum capital outlay. Advantage should be taken of every reliable heat conservation and power increasing factor to reduce weights and meet the growing engineering opinion that the art of motive power design permits locomotives of the largest capacity necessary for efficient operation and still be in entire harmony with the economical railroad standard.

Idle weight and spare steam is capitalized by The Locomotive Booster. The Booster is a power unit—not a specialty—and it should be part of the design of every new locomotive to meet the new demands which now confront operating and maintenance officials.

RAILWAY SUPPLY COMPANY, INC.

CHICAGO **MONTREAL**

NEWS

Plan for Consolidated Fiscal Agency Recommended to Co-ordinator

Co-ordinator Eastman has transmitted to the Regional Co-ordinating Committees representing the railroads a report in regard to railroad fiscal and related work prepared for him by J. Edward Davey under the general supervision of N. B. Haley of the Interstate Commerce Commission's staff, who has aided him in research work. The report recommends the establishment in New York city of a transportation fiscal corporation and a transportation trust company, both to be owned and controlled by, and to do work for, the railroads collectively. The conclusion is reached that a potential saving of not less than three-quarters of a million dollars per annum might be accomplished but under the plan proposed the establishment and development of these agencies in full operation would proceed gradually, beginning with the fiscal corporation. It also appears, Mr. Eastman says in his letter of transmittal, that these economies could be secured without conflict with Section 7(b) of the emergency act, presumably on the ground that the employees to be dispensed with are largely bank employees rather than railroad employees. "Any final conclusions on my part will await your advice on the matter," Mr. Eastman said, "but I know the report has been prepared with painstaking care and with every effort to make it thorough and complete."

The report shows that out of over 1200 railroads of all classes, covered by the survey, 185 roads, including system lines, maintained fiscal offices in New York city during either or both of the years 1929 and 1933 (the representative years selected for the study) at overall costs of $1,351,900 and $891,500, respectively, for those years. It also shows that 621 railroads paid a total of $2,715,350 to 287 fiscal agencies, both domestic and foreign, for the two years combined.

From an agency standpoint the report sets forth the various agencies in New York city which received in excess of $1,000 per annum in connection with railroad fiscal and related work. The highest amounts paid to any one agency were $303,500 in 1929 and $340,700 in 1933. The amounts paid foreign agencies were relatively unimportant. It is interesting to note that one agency alone acted for 127 railroads, and that one railroad employed 26 agencies, located both in and outside of New York city.

With reference to the volume of the work, the report goes into considerable detail and shows, by individual railroads, the volume from the standpoint of bond units outstanding, accounts maintained, stock transfers, dividend checks issued and registrations by classes of securities.

The report shows J. P. Morgan & Co., as acting as agent for 43 railroads, the Guaranty Trust Company for 127, the Central Hanover Bank & Trust Company for 115, the Bankers Trust Company for 60, the Chase National Bank for 53 and the City Bank Farmers Trust Company for 50.

After a meeting of the board of directors of the Association of American Railroads in Washington on June 21, President J. J. Pelley said the policy to be followed in view of the continuation of the emergency transportation act for another year was discussed but that no action was taken as to any change. He expressed the opinion that many things will be undertaken to bring about economies during the coming year and said that the policy would be to do everything possible under the act.

Fourth Section Relief Denied As To Commodity Rates

The Interstate Commerce Commission, Division 2, has issued a report and order denying fourth-section applications filed by the railroads for authority to establish commodity rates from, to, and between points included in the southern and eastern class rate revisions, over the same routes over which class rates are authorized to be established, without observing the long-and-short-haul provision of Section 4 of the interstate commerce act. Because of the general nature of the applications, the report said, "we are not persuaded that they present a special case wherein relief is justified."

P. & S. Annual Meeting

Final arrangements for the annual meeting of the Purchases and Stores Division, A. A. R., were completed at a meeting of the General Committee last week. According to announcements sent to members, the meetings will be held at the Palmer House, Chicago, on Tuesday and Wednesday, July 23 and 24, the sessions convening at 10 a. m. Central Daylight Saving time. The chairmen and members of subject committees are expected to be present and representatives of all member roads are invited to attend the meeting and participate in the discussions. The meeting will be confined to the presentation of completed committee recommendations and other business matters. No exhibits or entertainment features will be provided. A full report of the proceedings will be published in the *Railway Age* of July 27.

Inaugural Run of Baltimore & Ohio's "Royal Blue"

The Baltimore & Ohio on June 24 inaugurated streamlined passenger train service between Washington, D. C., and New York. Its "Royal Blue," light-weight passenger train hauled by one of its two new high-speed steam locomotives—the "Lord Baltimore"—made the 224-mile run from the Capital to the B. & O.'s Jersey City, N. J., terminal in 3 hrs. 59 min.

During the course of the run a speed of 95 m.p.h. was attained and one six-mile stretch was covered in 3 min. 40 sec. The regular schedule calls for a Washington-Jersey City running time of 4 hrs. and

(c) *Harris & Ewing*
The Christening of the "Royal Blue"

the train will make one round trip daily, leaving Jersey City at 9:57 a. m., Eastern Standard Time, and Washington at 4:15 p. m. The locomotive and cars of the "Royal Blue" were described in detail in the *Railway Age* of May 4.

The christening took place at Washington on June 24 prior to the train's initial departure. Miss Marie McIntyre, daughter of Marvin H. McIntyre, one of President Roosevelt's secretaries, performed the christening ceremonies, which consisted of the breaking of a bottle of the merged waters of the seven principal rivers crossed by the "Royal Blue" on its run to New York. Accompanying Miss McIntyre was a court of honor consisting of 50 members of the Baltimore & Ohio Women's Music Club. Also, as part of the ceremonies, approximately 1,000 carrier pigeons owned by B. & O. employees were re-

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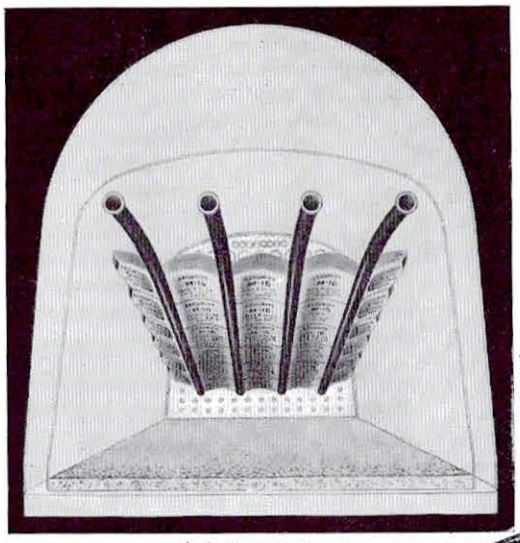
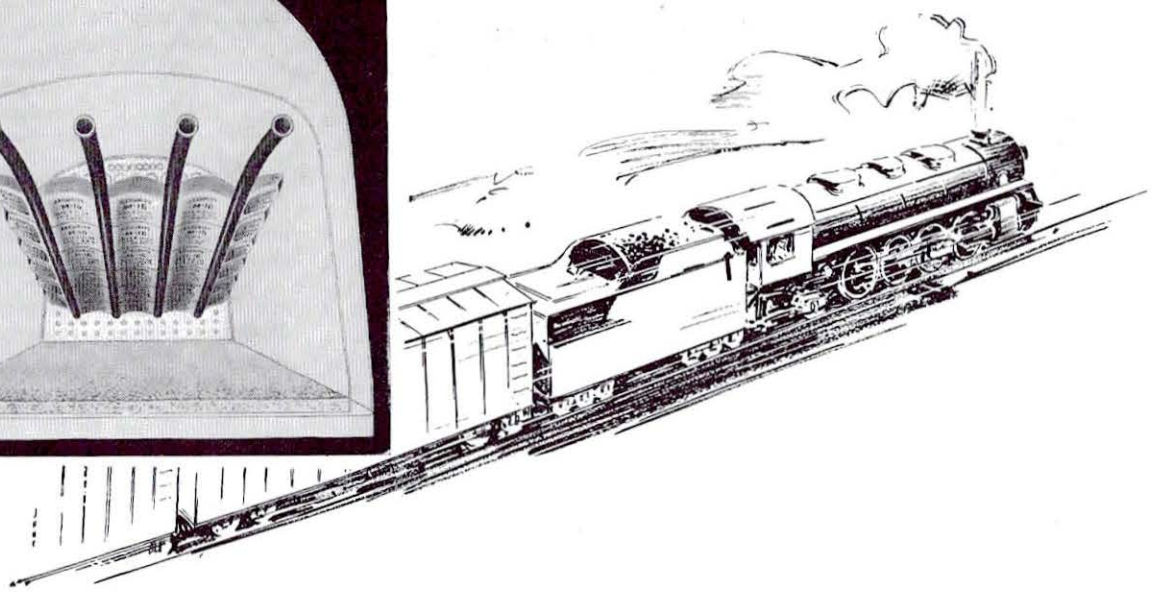


There's More to
SECURITY ARCHES
Than Just Brick



THE HARDER THE LOCOMOTIVE WORKS

the More

THE SECURITY BRICK ARCH SAVES

The rough battle scarred undersurface of the Security Arch tells a tale of big coal saving.

Large modern power, longer runs, higher firebox temperatures are tough on Arch brick but they all increase the returns from the Security Arch.

Measured in terms of thousands of ton miles the Security Arch renders greater service than it did when conditions were less severe.

Measured in terms of fuel consumed the Security Sectional Arch is today one of the most effective of all fuel economy devices.

HARBISON-WALKER REFRACTORIES CO.

Refractory Specialists

NRA MEMBER U.S. WE DO OUR PART

AMERICAN ARCH CO.
INCORPORATED

Locomotive Combustion Specialists » » »

leased from a point just ahead of the locomotive, these pigeons bearing messages to governors and mayors of their home cities and states.

The B. & O. statement issued in connection with the inaugural run explains that the name "Royal Blue" was chosen because it is still a favorite with those who traveled on the B. & O. 30 years ago—and "with many persons still alluding to the B. & O.'s Washington-New York service by that name it was decided to give it to the new streamliner."

The statement also points out that within a few weeks an 1800 h.p. Diesel-electric locomotive will be hauling the "Royal Blue," it being the desire of the B. & O. "to compare the two types of power in a so-called laboratory test, the benefits of which will be available to the whole railroad industry."

Hearing on Warehousing and Storage at New York

Further hearings in connection with the Interstate Commerce Commission's investigation of warehousing and storage of property at the Port of New York opened in that city on June 24. The proceeding is Part VI of the Ex Parte 104 investigation of practices of carriers affecting operating revenues or expenses and Director Bartel of the I. C. C. bureau of service presided at the New York Session.

Examination for Railroad Accountant in New Jersey

The New Jersey State Civil Service Commission has announced for July 18 an examination for the position of railroad accountant in the Railroad division of the State Tax Commissioner's office. The position carries an annual salary of $3600 and application blanks, obtainable from the Civil Service Commission at the state house in Trenton, must be filed with the Commission not later than July 12.

Traffic Club of Baltimore

The annual meeting of the Traffic Club Forum, which is the educational branch of the Traffic Club of Baltimore, was held on June 6 at the Hillendale Golf Club, Baltimore, Md. The following officers of the Forum were elected for the coming year: President, Paul K. Partee, division superintendent on the Baltimore & Ohio; vice-president, Melvin A. Myers, general freight agent on the Canton; secretary, Albert Lee Sherry, freight representative on the Baltimore & Ohio. The Club's annual summer outing was held on June 13 at Fairview Beach, Md.

Burlington Service Restored After Flood Damage

Through train service on the Burlington's main line into Denver, Colo., was restored on June 23 after 23 days of concentrated work to repair the damage done on 216 miles of line in the valley of the Republican river in southern Nebraska, as described in the *Railway Age* of June 8 and 15. This portion of the Burlington's line suffered heavily from a terrific run-off in this valley, following cloudbursts in eastern Colorado and southern Nebraska, during the course of a period of unusual rainfall that caused extensive damage to many railroads between the Mississippi river and the Rocky mountains.

Senate Sub-Committee to Investigate Railroad Financing

The Senate committee on interstate commerce has chosen the following as a sub-committee to conduct the investigation into railroad financing provided for by a Senate resolution proposed by Chairman Wheeler: Senators Wheeler, Wagner, Barkley, Donahey, Couzens, White, and Shipstead. Hearings are not to begin until Fall but Co-ordinator Eastman is expected to select shortly the names of the railroads to be included in the investigation and preliminary work will be done with the assistance of the Interstate Commerce Commission. Max Lowenthal, a New York lawyer and author of a book "The Investor Pays," has been selected as counsel for the committee.

Unitcast Sills for Rustless Iron Hopper Car Made by General Steel Castings Corp.

In an article describing the light-weight hopper car, designed by the Unitcast Company and built at the plant of the Ralston Steel Car Company for the Rustless Iron Corporation of America, which appeared on page 954 of the June 22, 1935, issue of *Railway Age*, the fact was omitted that the Unitcast center sill, which forms the backbone of the car, was made by the General Steel Castings Corporation.

New York Railroad Club Outing

Less regulation and lower taxation for the railways, and not more of each for their competitors, is the prescription for railway ills favored by Alfred E. Smith, former governor of New York. This view he expressed in an informal speech at a dinner following the outing of the New York Railroad Club at the Westchester Country Club, Rye, N. Y., on June 20.

"If I had a boy who wanted to go into railroad work," declared the former standard bearer of the Democratic Party, "I would advise him against it. If he had brains and initiative, he could not get anywhere with them with Interstate Commerce Commission regulation.

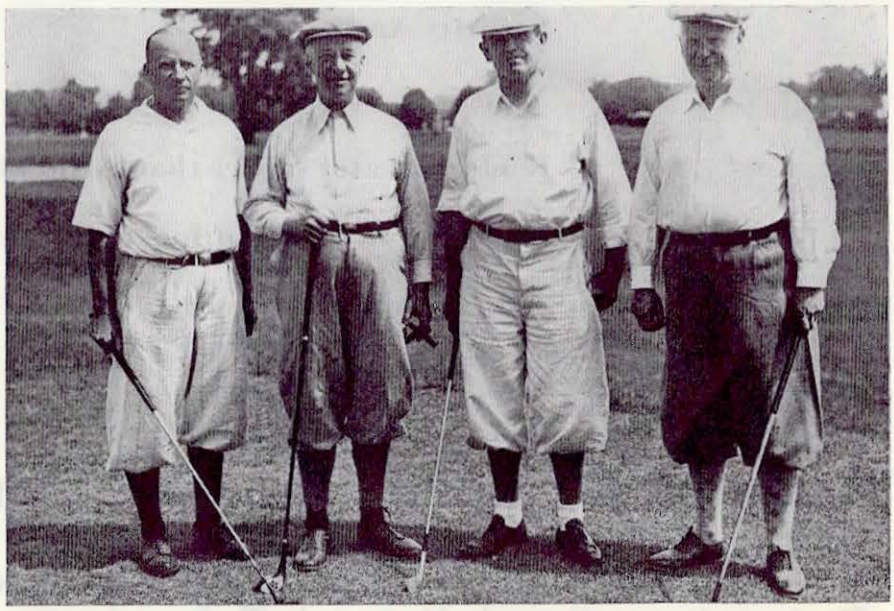
"The government cannot do business well. It is not organized to do it. As a matter of fact, the government doesn't do its own business very well. If some of us here would get together and take over the postal service, we could probably make money out of it instead of incurring deficits as the government is doing.

"Railroads need not be afraid of the march of progress in transportation. The development of new agencies has rendered some of their branch lines obsolete, and these should be abandoned, but the time will not come in our life time when the railroads will not be the main arteries of our national transportation system."

Attendance at the New York Railroad Club outing totaled 750. Most of those in attendance played golf through the day, and other diversions were provided for those who did not. The Western Union Telegraph Company's golf team won the custody of the Herbert H. Vreeland trophy. The Brady cup was won by C. E. Simmons, Jr. Watts Gunn, of the Western Union Telegraph Company, won the low gross award in class A, with a score of 78; L. G. Sullivan, with 88, won class B; and P. R. Kellar, with 98, won class C. H. L. Wetherwax, vice-president of the United Traction Lines, Albany, N. Y., won the low gross for the guests with 75. R. D. Starbuck, executive vice-president of the New York Central, won the "kickers' handicap."

N. E. Governors' Group Meets With Railway Officers

Representatives of the New England governors conferred in New York on June 26 with officers of the Pennsylvania, the New York Central, the Boston & Maine, the Maine Central and the New York, New Haven & Hartford, regarding the



S. N. Mills, Asst. Director Bureau of Safety, I. C. C.; Governor Smith; G. J. Ray, Vice-President, D. L. & W.; J. F. Gilchrist, Former N. Y. Public Service Commissioner

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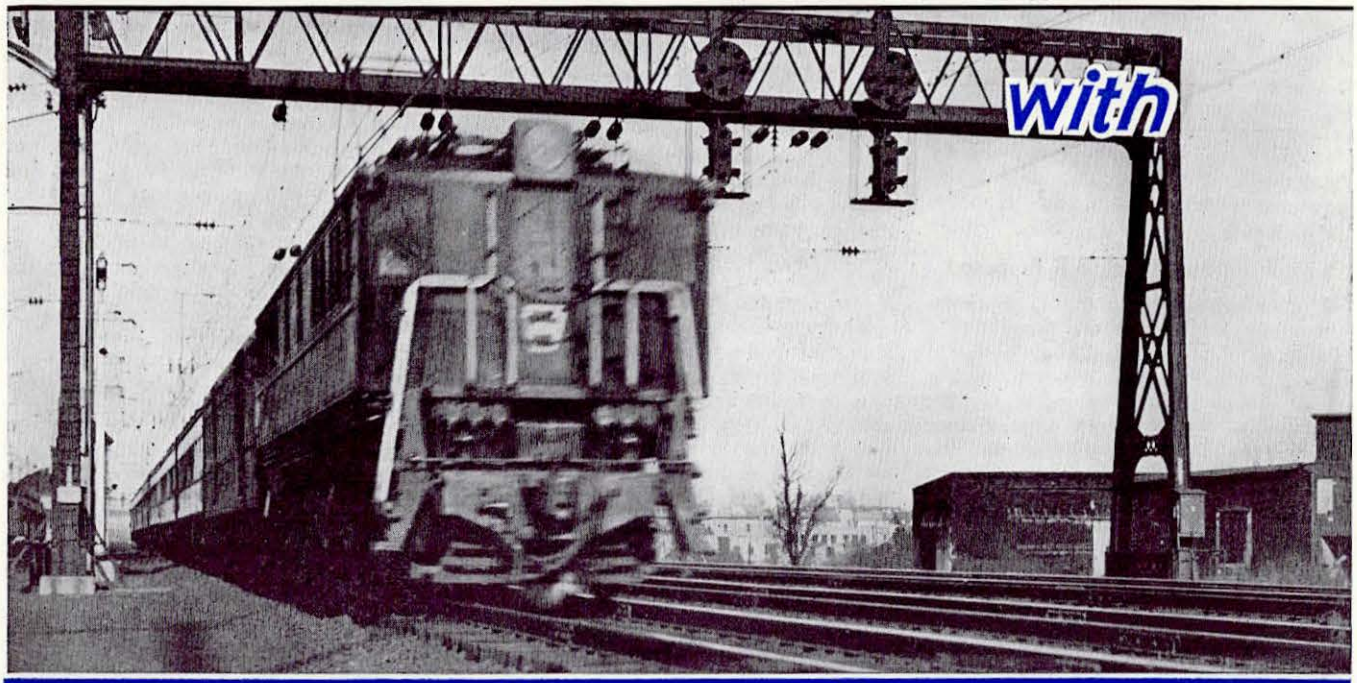
NOW - Increased Safety of Operation



"UNION" Coded Track Circuit Control

Increased safety of operation with the "Union" Coded Track Circuit Control System is obtained by (a) elimination of many troubles encountered with older systems through (b) the reduction of the use of line signal control wire and by (c) automatically checking against any crosses or grounds in the control circuits and (d) eliminating the sources of most causes of false "clear" signal indications. » » » » » » »

The system is equally effective in steam or electrified territory and may be employed for two-block, three indication signaling or three-block, four indication. It may be used for controlling wayside signals only, or wayside and cab signals in conjunction. It is applicable where track circuit energy is direct current, alternating current or a combination of both. » » » » »

Our nearest district office will be glad to furnish detailed information about this latest "Union" signaling achievement. » » » » »

971

1881 **Union Switch & Signal Co.** 1935

SWISSVALE, PA.

NEW YORK MONTREAL CHICAGO ST. LOUIS SAN FRANCISCO

present and proposed control of the New England railroads. The governors have heretofore objected to any degree of control of the Boston & Maine and the New York, New Haven & Hartford by the Pennsylvania or its affiliates. It was intimated, following the New York meeting, by one of the governors' representatives that, if the Boston & Maine were freed of any "trunk line control," possibly less objection would be aroused by some degree of affiliation of the New Haven and the Pennsylvania. However, no final agreement was reached and further meetings are in prospect.

Simplified Bus-Truck Bill Proposed

The sub-committee of the House committee on interstate and foreign commerce, headed by Representative Huddleston, of Alabama, which has been considering for several weeks the bill providing for the regulation of bus and truck transportation proposed by Co-ordinator Eastman, has agreed by a three-to-two vote on a report to the full committee on a bill much simpler than that originally proposed and that passed by the Senate. While the text of the sub-committee bill has not been made public it is understood that its provisions are confined largely to common-carrier truck operations, omitting the provisions relating to private and contract trucks in the original bill. The bill will now be considered by the full committee, which has been devoting its time for several weeks to the public utility bill, and Chairman Rayburn said he hoped that it would be possible to pass upon the bill at an early date.

First Zephyr Becomes a Four-Car Train

A fourth car has been added to the original Zephyr of the Chicago, Burlington & Quincy, the train making its first trip between Lincoln, Neb., and Kansas City, Mo., as a four-car train on June 24. The addition of the fourth car increases the capacity from 72 seats to 112. An inspection of the train, conducted by officers of the Burlington, the General Motors Corporation and the Budd Manufacturing Company, showed that not a single part had worn perceptibly. The train had traveled 138,937 miles, of which 100,000 miles had been run since November 11, when the train was placed in daily service.

The first Zephyr, during its more than seven months' performance as a passenger carrier, has shown an increase in passenger traffic of 136 per cent, as contrasted with the two steam trains it supplanted. The popularity of the streamliner is emphasized by the contrast of this high percentage with the 18 per cent increase in passenger travel over the entire Burlington System. The average number of passengers per day in each direction from November 11 to June 19 has been slightly over 100, the southbound trip with 106.8 showing to a little better advantage than the northbound service of 100.6. The average per diem patronage from one terminal to another has been as high as 121 and as low as 89, although the seating capacity prior to the insertion of the new car was limited to 72.

The cost of operation and maintenance on this 500-mile run during the intervening 217 days has been approximately 35 cents per mile, as compared with a cost of 65 cents per mile with the previous steam equipment.

P.R.R. and B. & O. Expedite New York-Pittsburgh L.C.L. Service

The Pennsylvania and Baltimore & Ohio this week inaugurated expedited l.c.l freight operations which afford overnight service in both directions between Atlantic seaboard points and the Pittsburgh (Pa.) district. The new schedules, available to shippers at regular rates, cut in half the time that l.c.l has previously been in transit over the routes involved.

The new Pennsylvania service, tied in with that road's pick-up and delivery plan, provides through door-to-door transportation over distances as great as the 440-mile New York-Pittsburgh haul. Two new scheduled freight trains have been inaugurated—one in each direction between New York and Pittsburgh, with a connection from York, Pa., and Baltimore, Md. The service is available to and from New York, Newark, N. J., Trenton, Philadelphia, Pa., Baltimore, York, Pa., Harrisburg and their surrounding areas. The new trains will also handle cars to and from Pittsburgh Transfer, thus extending a faster service to a number of western Pennsylvania and central Ohio points.

The Baltimore & Ohio in connection with its expedited service has also established two new freight trains—one in each direction between Philadelphia and Pittsburgh. This permits the late afternoon receipt of l.c.l. at local freight houses in cities affected, such as New York, Philadelphia, Baltimore and Washington, and its delivery at Pittsburgh freight houses at 7 a. m. the following morning.

Western Lines to Establish Unlimited Free Pick-Up and Delivery

Free pick-up and delivery service on any-quantity merchandise and lower class rates will be placed in effect in western trunk line territory this fall, probably September 1, according to plans now being formulated by the Western Trunk Line committee. Under the new tariff now under preparation, free service will apply on all l.c.l. shipments having origin and destination within the 11 states and part of another that comprise western trunk line territory. Shipments of any amount will be accepted. First-class rates will be substantially reduced and existing relationships of other class rates retained, resulting in reductions in all class rates.

Contracts for drayage are being arranged and an allowance of 5 cents per 100 lb. will be allowed, when the service is performed by the shipper or consignee.

The establishment of pick-up and delivery service at all stations in Colorado, Illinois, Indiana, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, Utah, Wyoming, Wisconsin and the upper peninsula of Michigan, follows action taken by individual carriers on April 1, when several roads established pick-up and delivery service on shipments of 6,000 lb. or more at certain stations. The new tariff will replace the individual tariffs now in effect.

Maximum reduction in rates will be made on rates of $1.50 or less per 100 lb. This is an approximate median figure and represents the first-class rate for a haul of approximately 500 miles. The new rate will be 90 per cent of the present rate where the latter is $1.50 or less. Where the present rate is $1.51 to $1.67, both inclusive, the new rate will be 92 per cent of the present; from $1.68 to $1.85, 95 per cent; and from $1.86 to $2, 97 per cent. Present rates will apply where they exceed $2 per 100 pounds.

The present relationship of class rates will be retained. Second-class rates will be continued at 85 per cent of first class, third class at 70 per cent and fourth class at 55 per cent.

Bennett Opposes Write-Down of C. N. R. Capital

Premier Bennett of Canada made it plain to Parliament at Ottawa last week that the government is opposed to any general writing down of the capital structure of the Canadian National, and he also disclosed the fact that the chairman of the board of trustees of the C. N. R., Hon. C. P. Fullerton, while admitting it would be useless to attempt any such revision in the face of the government's attitude, told the Prime Minister that he was personally in favor of such a downward revision.

Meeting the request made in the House by Ross W. Gray (Liberal, Ontario) the Prime Minister read a letter he had written to Mr. Fullerton last year in which he expressed surprise that the auditors should have recommended a recasting of the capital structure of the railway and also the letter of Mr. Fullerton in reply. After reading the two letters Premier Bennett made a brief statement in which he qualified his declaration against downward revision.

It was stated by the Prime Minister that while the government was resolutely opposed to writing down the capital structure in so far as it reflected the investments made in the publicly-owned road by the government of Canada he would not object to a downward revision of the valuations of the stock acquired from the former Grand Trunk and the Canadian Northern. To go farther than this latter step, he contended, would make it impossible for the Canadian people to get an accurate picture of the financial stake the country had in this enterprise.

Another important reason for the present opposition of the government to writing down the capital structure was that there was now pending a case before the Privy Council in London. It would be improper, the Prime Minister asserted, to make any move toward alteration of the capital set-up until the Privy Council had made known its decision in the present case before that body.

The Prime Minister's letter to Mr. Fullerton was as follows: "The changes proposed in the report of the Canadian National are wholly at variance with the views entertained by the government. It seems almost incredible that the auditors

25 Years . .

Serving

American Railroads

TWENTY-FIVE YEARS AGO, at the time when the locomotive had reached its limit of power with saturated steam, the superheater, placed on a practical basis by this company, gave the locomotive one-third more hauling power with a more economical fuel and water rate.

Today few locomotives are without superheaters. The efficient high-powered locomotives of today, in fact, would not be possible without the locomotive superheater.

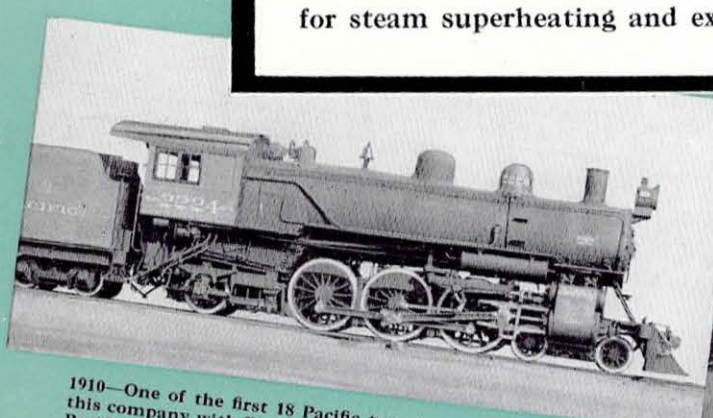
Since its organization in June 1910, as Locomotive Superheater Company to extend the use of high-degree superheat on American railroads, more than 57,000 Elesco superheaters have been applied to American-built locomotives. It is estimated that under normal conditions superheaters save the railroads $100,000,000 a year in fuel, besides increasing locomotive hauling capacity and speed.

In more recent years, this company introduced other fuel-saving and capacity-increasing apparatus—the Elesco feed water heater and the Elesco exhaust steam injector. They, too, have been applied extensively to new and old power as essential factors for improving locomotive performance.

With equipment on thousands of locomotives all over this country—and many thousands of locomotives equipped by associated companies abroad—we naturally are able to study performance under every kind of service conditions and to observe trends in locomotive operating requirements. Hence, there has been a continuous improvement, standardization, and development of Elesco equipment to keep step with changing operating conditions and to give better economy . . . to the end that American railroads might always have the best and most efficient means for steam superheating and exhaust-steam feed water heating.

The Superheate Company

ELESCO



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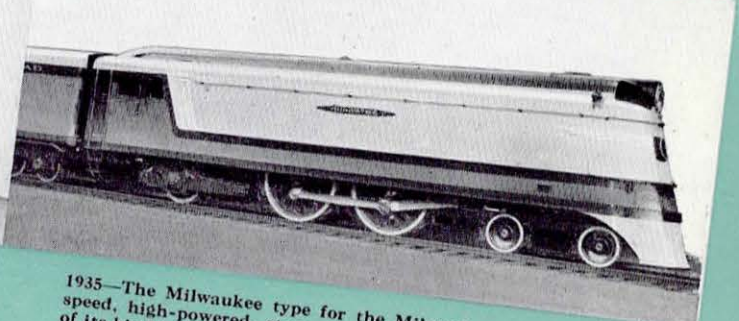


1935—The Milwaukee type for the Milwaukee Road. A high-speed, high-powered, streamlined steam locomotive, the first of its kind built in America. Equipped with Elesco superheater and American multiple throttle.

Steam Locomotives are for *Economical* and *Efficient*

A DETERMINING factor in the earning capacity of American railroads is a general speeding up of traffic movements . . . but without sacrificing safety, comfort, flexibility, economy . . . elements which have been achieved only by persistent improvement and development . . . elements which make American railroads the most efficient and reliable rail transportation service in the world today.

Constantly higher standards of performance are being maintained by the railroads. Yet, during the past ten years, greater improvements have been made in steam locomotive design than within any decade of the past century. Locomotives built today can do double the work of those built 10 to 15 years ago. This means that newly built steam locomotives to supplant existing power will pay interest and amortization charges within ten years.

It is a tribute to the flexibility of the steam locomotive that a number of railroads have speeded up their train schedules with existing steam equipment . . . running speeds of 90 to 100 miles an hour are today not uncommon. Many locomotives designed to provide a ratio of 3.25 to 3.5 hp. per ton of trains handled, now are loaded to 2.5 to 2.75 hp. per ton and giving excellent service . . . in contrast to a rated horsepower capacity of above 4 hp. per ton for recently

STEAM SUPERHEATING

Although, in 1828, Richard Trevithick made the first known practical application of superheated steam, the history of the locomotive superheater really commences in 1898. In that year, a number of engines with smokebox-type superheaters, developed by the late Dr. Wilhelm Schmidt, of Cassel, Germany, were placed in service on the Prussian State Railway.

In 1902 Dr. Schmidt introduced his firetube superheater, which soon superseded the smokebox apparatus entirely. This type established the general lines upon which locomotive superheaters now are designed. It, therefore, is a prototype of the present Elesco superheaters.

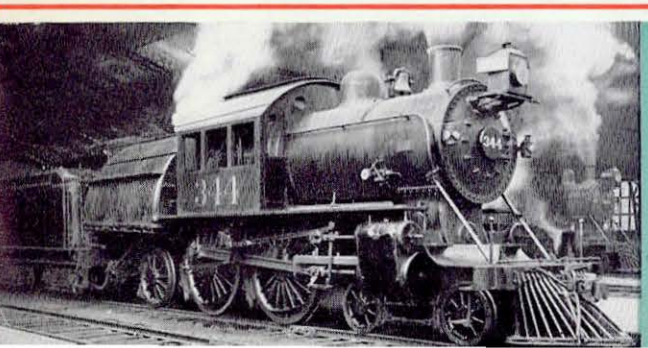
Numerous designs of superheaters were tried in this country. By the end of 1906, about 15 locomotives were superheater equipped, including some experimental applications of Schmidt firetube superheaters.

In July 1910, this company made its first large application of Elesco superheaters to 18 Pacific type locomotives built for the Northern Pacific Railway by American Locomotive Company. Fifteen of these locomotives still are in service.

Contrast these first superheater locomotives with present-day engines. The power of today has increased sustained capacity at higher speeds and is surprisingly more efficient in the use of fuel and water. This increased effectiveness is made possible, in large measure, by Elesco superheaters of the same basic design, although themselves vastly improved to meet increased demands.

For, the Elesco superheater has been continuously improved and developed to give higher

WE SERVE EVERY STEAM RAILROAD IN AMERICA—



High speeds are nothing new to the steam locomotive. Here is the first passenger locomotive on the Reading Railroad equipped with an Elesco (Schmidt) superheater. In 1912, while hauling the Atlantic City Express between Camden and Atlantic City (N. J.), this locomotive attained a running speed of 120 miles an hour. Between these two cities, a distance of 55½ miles, this locomotive regularly maintained its schedule with as many as 14 cars at an average speed of 69.3 to 71.6 miles an hour. To maintain this schedule steam locomotives frequently reached 112 miles an hour—even as far back as 1897.

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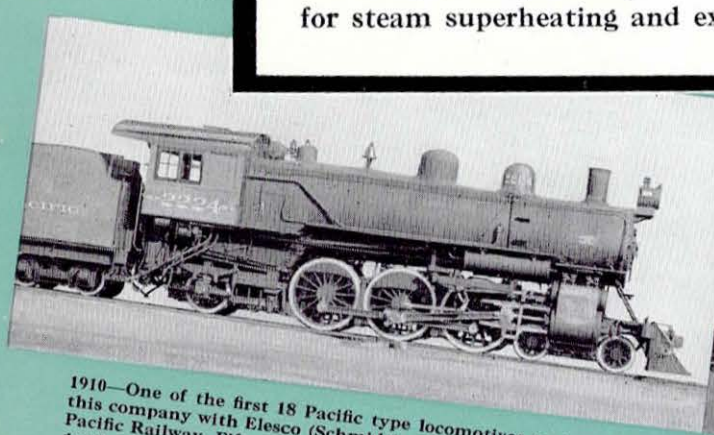

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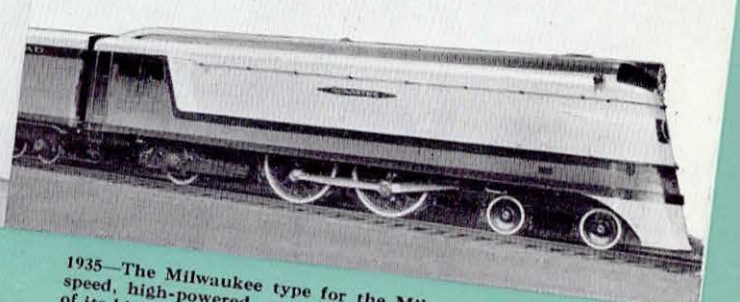

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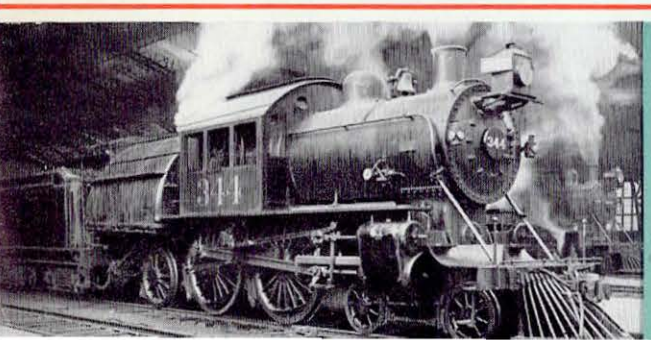
Numerous designs of superheaters were tried in this country. By the end of 1906, about 15 locomotives were superheater equipped, including some experimental applications of Schmidt firetube superheaters.

In July 1910, this company made its first large application of Elesco superheaters to 18 Pacific type locomotives built for the Northern Pacific Railway by American Locomotive Company. Fifteen of these locomotives still are in service.

Contrast these first superheater locomotives with present-day engines. The power of today has increased sustained capacity at higher speeds and is surprisingly more efficient in the use of fuel and water. This increased effectiveness is made possible, in large measure, by Elesco superheaters of the same basic design, although themselves vastly improved to meet increased demands.

For, the Elesco superheater has been continuously improved and developed to give higher

WE SERVE EVERY STEAM RAILROAD IN AMERICA—



High speeds are nothing new to the steam locomotive. Here is the first passenger locomotive on the Reading Railroad equipped with an Elesco (Schmidt) superheater. In 1912, while hauling the Atlantic City Express between Camden and Atlantic City (N. J.), this locomotive attained a running speed of 120 miles an hour. Between these two cities, a distance of 55½ miles, this locomotive regularly maintained its schedule with as many as 14 cars at an average speed of 69.3 to 71.6 miles an hour. To maintain this schedule steam locomotives frequently reached 112 miles an hour—even as far back as 1897.

the Mainstay Rail Transportation

25 Years . . Serving American Railroads

ELESCO

built Diesel-electric trains, at a cost of three to four times as much for the same horsepower in modern steam locomotives.

Increased steam pressures, higher superheats, and exhaust-steam feed water heating are the essential factors of modern steam locomotives which make it possible to provide the necessary horsepower in suitably sized units to meet any service requirements of capacity and speeds. Only steam power is available in units of sufficient capacity and economy for heavy freight traffic at high speeds.

Steam motive power, embodying the available improvements in design, is capable of furnishing any speed desired—the limitation is usable speed consistent with safety and comfort—and, at the same time, without introducing any unproved factors and excessive investment.

These are inherent factors of design of the steam locomotive . . . in which Elesco superheaters and Elesco feed water heating equipment have an essentially leading part . . . and which leave no question as to the supremacy of the steam locomotive to meet present-day and future needs for economical and efficient rail transportation.

superheats, increased capacity, greater efficiency. These advances make possible locomotives which will develop more drawbar horsepower with reduced unit fuel consumption, within the limits of weights and clearances.

FEED WATER HEATING

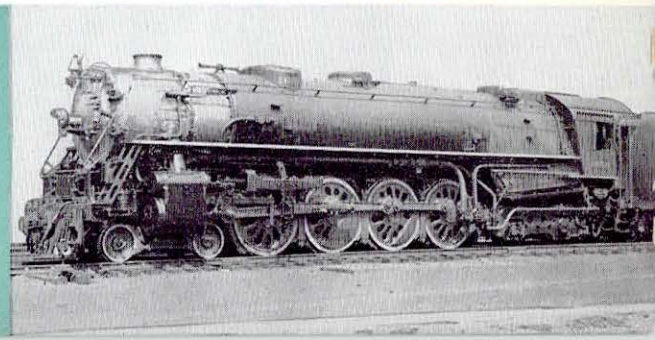
Following the superheater, so quickly recognized and generally adopted, came developments of exhaust-steam feed water heating equipment. This equipment reclaims a considerable part of the heat in exhaust steam, which otherwise is wasted, and returns this heat to the boiler through preheated feed water.

Exhaust-steam feed water heating is as sound in principle and practice as superheating steam and is a logical step for further economy in locomotive operation. It provides increased boiler capacity, increased fuel economy, increased tender capacity, and increased hauling capacity. These improvements are so generally accepted that it now is unusual for a locomotive to be built without some form of exhaust-steam feed water heating equipment. To existing locomotives, feed water heaters give the equivalent of a larger boiler and an economic license to remain in service.

This company has had an active part in this development during the past 15 years. Two types of Elesco feed water heating equipment are available, namely, the closed or non-contact heater and pump type, and the open or exhaust-steam-injector type. Each type satisfies certain conditions or preferences. Because of practicability of design and high efficiency in performance, both types have been widely applied by leading railroads.

THROUGH AFFILIATES WE SERVE RAILROADS THE WORLD OVER

Delaware, Lackawanna and Western Railroad recently placed in service 20 of these 4-8-4 type locomotives. The road now has 55 locomotives of this same general design. These locomotives are fine examples of modern high-powered locomotives designed to handle either heavy passenger or fast freight trains, as traffic conditions require. A boiler of liberal proportions, equipped with Elesco type E superheater (with multiple-valve throttle-header), provides ample generating capacity to sustain a maximum of 4,025 potential horsepower over long continued periods. Two of these locomotives have Elesco exhaust steam injectors.



A *Worldwide* Organization Is Behind *Elesco Service*

25 Years . . *Serving* American Railroads

THIS organization is not merely national, but international in the kind, character, and extent of its activities.

Associated companies in Canada, Great Britain, France, Germany, and Australia give it the advantage of the cumulative knowledge and experience with steam superheating extending over the entire world for a period of 45 years. These associated companies are working in unison, both in practical application and economical service. Each has ample facilities, with plants advantageously located to serve each country.

During the past 15 years the activities of this company not only have been broadened in the railway field, but they have been extended to include steam power and process equipment for power plants, and the oil and process industries. In 1933 the scope of operations was widened still further, which placed the company in a position to offer complete boiler plant equipment and engineering service to public utility and industrial power plants, as well as to the railroads.

Thus, within easy reach are the very latest developments and the broadest fund of experience connected with efficient generation and use of steam for power and process, and the utilization of waste heat in all their phases.

THE Key TO CORRECT SUPERHEATER DESIGN

A distinguishing characteristic of superheaters manufactured by this company and its associated companies is the exclusive use of return bends, integrally forged with the tubing to form the loops of superheater units. The integrally forged return bend actually is the key to correct superheater design, and has distinct advantages for other heat-transfer apparatus. Its extreme flexibility gives unhampered control over design fundamentals for handling all steam superheating requirements most economically. Millions of these return bends in daily use in locomotive, stationary, and marine services have proved their superiority for withstanding the most rigorous conditions of any superheating services. Railroads all over the world have applied superheaters with integrally forged return bends to more than 100,000 locomotives.

These return bends are machine-forged with flawless accuracy from the tubing itself, without utilizing either additional material or a flux. They are stronger at the bend where strength is needed most. They provide constant area through the bend, with smooth internal and external surface—avoiding restrictions of steam through units or accumulation of soot, ashes or cinders.

THE SUPERHEATER COMPANY

Representative of AMERICAN THROTTLE COMPANY, Inc.

60 East 42nd Street
NEW YORK

Peoples Gas Building
CHICAGO

A-990

Associated Companies

Combustion Engineering Company, Inc.
200 Madison Avenue, New York

The Air Preheater Corporation
60 East 42nd Street, New York

The Superheater Company, Limited
Dominion Sq. Bldg., Montreal, CANADA

The Superheater Company Limited
Bush House, Aldwych, London, ENGLAND

Compagnie des Surchauffeurs
Rue de Berri 29, Paris, FRANCE

Schmidt'sche Heissdampf-Gesellschaft, m. b. H.,
Rolandstrasse 2, Cassel-Wilhelmshöhe, GERMANY

The Superheater Company (Australia) Limited
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should suggest that advances made by the government for capital purposes to the railway company be treated in its accounts as capital stock, that is to say, as a non-interest bearing obligation and that advances to meet deficits be written off completely. Deficits and interest must continue to appear in the accounts of the railway company if the public of Canada are to have any appreciation as to just what they have invested in their railways and what, from time to time, their advances really are. As representing the proprietors of the undertaking we must insist that the railway company's reports shall give a true picture of the real situation and that the annual report as issued will enable anyone perusing it to understand exactly what the Dominion of Canada has invested in its railway enterprises."

Labor Organizations Propose Another Revised Pension Plan

In another effort to get around the recent decision of the Supreme Court of the United States declaring the railroad retirement act unconstitutional, Senator Wagner, of New York, and Representative Crosser, of Ohio, on June 25 introduced in Congress two bills supported by the Railway Labor Executives' Association to provide for a railroad employees' pension plan similar to that declared invalid. In order to fool the court, which has declared that pension legislation is not a proper regulation of interstate commerce, the plan is divided between the two bills, which indicate no relation to each other except that they are consecutively numbered—one a bill to levy an excise tax upon the railroad employers and income taxes on their employees as well as upon "employees' representatives" and the other a bill to provide for the payment of the pensions. The first bill provides for a tax upon the employer of 4 per cent of the compensation (not in excess of $300 per month) of the employees, a tax of 2 per cent on the compensation of the employees, to be collected by the employer by deduction from the compensation, and a tax of 6 per cent on the compensation of the employees' representatives. The second bill also authorizes an appropriation of $50,000,000 for the payment of pensions. Senator Wagner has been making the argument in the Senate that the social security bill which is now in conference does not run counter to the court's decision on the ground that the provisions for imposing taxes and those for making contributions to the states for the payment of pensions are kept in separate parts of the bill, but in this instance he has gone a step farther and introduced separate bills. In a press statement explaining the new bills it is stated that "the annuities are to be paid out of the Treasury and the provisions for same are clearly constitutional."

The bills are: S. 3150, S. 3151, H.R. 8651, and H.R. 8652.

The Senate on June 25 passed Senate Joint Resolution 144, also introduced by Senator Wagner, continuing the Railroad Retirement Board in existence for 60 days for the purpose of liquidating its affairs. The President has proposed an appropriation of $35,000 for the purpose.

Senator Wagner also introduced another bill S. 3152, to extend the principle of workmen's compensation for industrial accidents to employees of interstate common carriers.

Hearings on Full-Crew Bill

Officers of the railroad labor organizations testified before a sub-committee of the Senate committee on interstate commerce on June 20, 21, and 24 in support of the "full-crew" bill, S. 2993, introduced at their request by Senator Wheeler, of Montana, and testimony in opposition to the bill was begun on behalf of the railroads on June 24 by J. W. Smith, vice-president and general manager of the Boston & Maine. The bill would require a crew of four men for passenger trains of less than five cars and an additional man for trains of five cars or more any one of which carries passengers or trains of ten cars none carrying passengers. It would also require a crew of five men for freight trains of less than 50 cars and an extra brakeman for trains of over 50 cars. Six men would also be required for local trains doing any switching or loading or unloading of freight.

The first witness for the bill was T. C. Cashen, president of the Switchmen's Union, who emphasized the hazardous nature of train operation and said the bill was an attempt to codify the best standard practice on the railroads. He was followed by J. A. Farquharson, W. D. Johnson, and John T. Corbett, national legislative representatives of the Brotherhood of Railroad Trainmen, the Order of Railway Conductors, and the Brotherhood of Locomotive Engineers, and Timothy Shea, assistant president of the Brotherhood of Locomotive Firemen and Enginemen. They gave numerous statistics of train and train service accidents and read from many reports of individual accidents, describing the difficulty of transmitting signals from one end of a train to another unless there is an intermediate man to relay them, and asserting that many of the accidents officially ascribed to negligence are caused by the physical impossibility of complying with all the rules with an inadequate number of men. Especial objection was made to the failure of the railroads to provide a helper for the motorman on many single-unit gas-electric cars and statistics were introduced to show that many grade crossing accidents are caused by the approach of automobiles on the "firemen's side." Mr. Johnson said that train operation to-day to a large degree is "taking chances and trusting to luck," and that the so-called "dead man control," used on many high-speed trains or cars, is not dependable because the pressure of a dead man's body may prevent it from automatically applying the brakes. He gave no examples, however, as to accidents from such a cause. He also said that the labor organizations were ready at any time to join with the railroads to make practical tests for the benefit of the committee on any railroad to prove the accuracy of their assertions as to the necessity for the legislation. Mr. Corbett told the committee that "safety, not savings, is of first importance in railroading" and criticized testimony given by railroad witnesses as to other bills on the railroad program in which objections were made on the ground of increased cost of operation. He said that no locomotive engineer in the country is receiving one-third as much pay as he should but at the conclusion of his statement he said that the railroads were forced to economize by the competition of unregulated and subsidized agencies of transportation that pay lower wages.

J. W. Smith, vice-president of the Boston & Maine and Maine Central, testified in opposition to the bill, describing in detail the operation of various kinds of trains to show that the railroads now employ additional brakemen where conditions warrant it and that where they do not warrant it an extra brakeman merely adds complications as to the division of the work and responsibility. He said the bill would not promote either safety or better service to the public but is clearly an attempt to create more jobs. The present crews, he said, are sufficient to operate the trains in a capable manner according to the rules and to take care of any emergency, but he pointed out that on many branch lines to-day there is so little traffic that there is never any occasion for putting out a flagman. The railroads are proud of their record for increased safety in recent years, he said, and further improvement can only be made by intensive application of methods now in effect, the improvement of facilities and training of the employees, whereas the improvement of equipment would only be interfered with by increases in operating expenses such as would be caused by passage of the bill. He estimated that the principal bills now advocated by the railroad labor organizations would increase operating expenses by $700,000,000 a year under present conditions of traffic. It would be more accurate, he said, to describe the bill as an "excess-crew bill."

Dr. Julius H. Parmelee, director of the Bureau of Railway Economics, also presented a statement in opposition to the bill, saying "the railways emphatically do not, as has been charged by one of the proponents, place savings ahead of safety," but that they do contend that when a proposed measure does not add to the safety of rail operations it is proper to apply to it the yardstick of costs and to judge it by that criterion. On the basis of a test made for a week in October, 1934, on which the railroads reported by questionnaire, he estimated that if the bill had been in effect throughout 1934 the cost to Class I railroads would have aggregated $70,000,000. This amount, he said, would increase the prospective deficit for the year 1935 to approximately one-quarter of a billion dollars, or more than a hundred million greater than the deficit incurred in 1932, the low point reached during the present depression.

Because Senators Bone and Shipstead throughout the hearing have been interjecting remarks to the effect that the railroads would not have to be so much interested in costs if they had not increased their capitalization so much, or if they had amortized their funded debt instead of paying dividends, Dr. Parmelee also gave a detailed statement showing, on the authority of the Interstate Commerce Commission and Co-ordinator Eastman, that the

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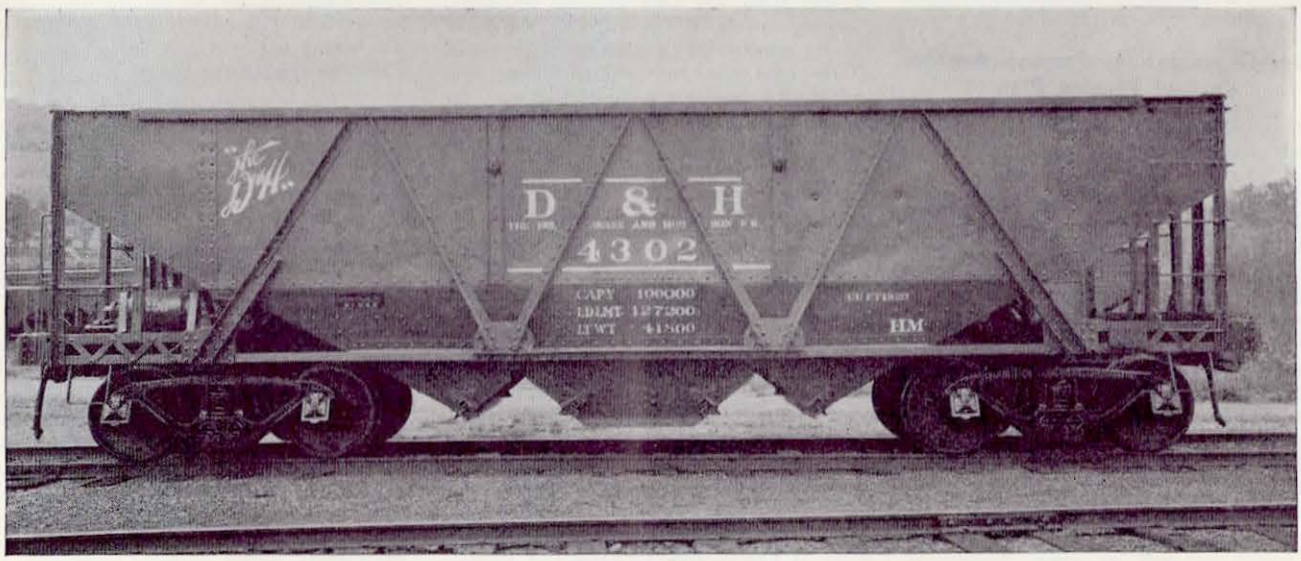
TYPE B TRUCKS
For Dependability and Economy



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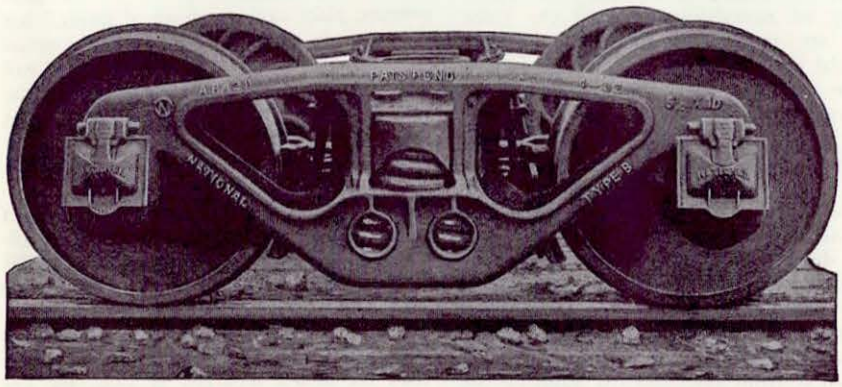

Over four years service of National Type B Trucks has proven their dependability and economy.

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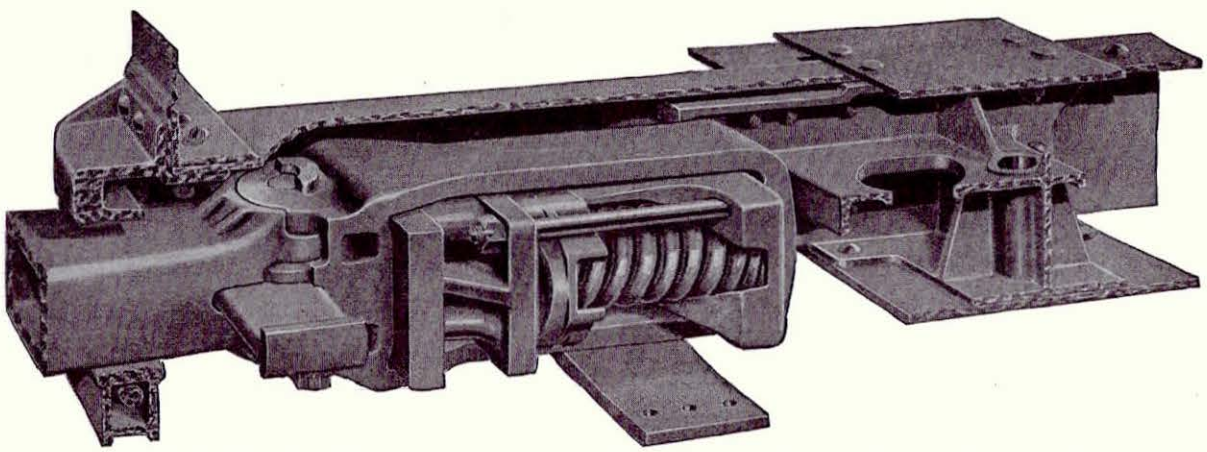
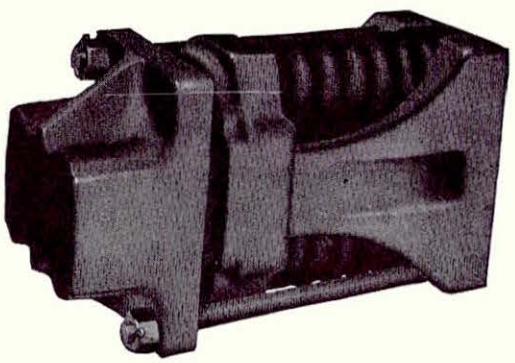
M-17-A DRAFT GEAR
For Better Car Protection



M-17-A Draft Gear with swivel butt coupler and vertical yoke

A. A. R. Approved NATIONAL M-17-A Draft Gears by years of continuous service, have proven their ability to give maximum protection to cars and lading and thereby reduce maintenance costs and damage claims.



Initial Spring Compression compensates all frictional wear and makes readjustment of gear unnecessary

NATIONAL MALLEABLE AND STEEL CASTINGS CO.

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railroads are not overcapitalized and that only a small part of the net increase of some $5,000,000,000 in their investment in the last 12 years has resulted in higher fixed charges. He quoted from the Bureau of Statistics a statement that in 1931 only 48 per cent of the net assets of the railroads as indicated by the valuation was represented by bonds and only 34 per cent by stock, and cited statistics to show that from 1923 to the end of 1934 the capitalization had been increased by only $1,500,000,000, or 9 per cent, while the investment had increased 25.9 per cent, the funded debt by 10.7 per cent, and the interest on funded debt by only 8.8 per cent.

President Asks Higher Taxes on Bigger Companies

Following a conference between the President and Congressional leaders on Monday it was announced that an effort would be made to pass at this session legislation of the kind recommended by the President in a special message last week proposing not only larger inheritance taxes and income taxes in the higher brackets but also a plan for graduating corporation income taxes according to the size of the corporate income. This would not only apply the "soak-the-rich" idea but extend it to penalizing the larger aggregations of the investments of persons with smaller incomes. He said that in place of the present uniform corporation income tax of 13¾ per cent "the rate for smaller corporations might well be reduced to 10¾ per cent and the rates graduated upward to a rate of 16¾ per cent on net income," but no suggestion was made as to where the line would be drawn between the smaller and the larger corporations. Under present conditions presumably many railroads would come within the class of smaller corporations, although some would be in the class whose rate would be increased. The President also proposed the ultimate elimination of "unnecessary holding companies" in all lines of business.

A tentative bill, said to have been prepared by the Treasury Department, to enable the federal government to "share-the-wealth" to the extent of some $340,000,000 additional a year, which has been considered by the Senate finance committee, proposed a scale of corporate income taxes ranging from 10 to 15 per cent on incomes up to $300,000 a year up to 16 per cent on incomes from $300,000 to $1,000,000, 17 per cent from $1,000,000 to $20,000,000 and 17½ per cent above $20,000,000. It is understood that it is proposed to repeal the provision for consolidated returns, on which an additional 2 per cent is now imposed.

The President has described the plan as intended to "progressively lighten the tax burden of the average taxpayer, and, incidentally, assist in our approach to a balanced budget." He has also spoken of its purpose both to raise revenue and to contribute to a better social order. He explained the plan for graduated corporation taxes by saying that "the advantages and protections conferred upon corporations by government increase in value as the size of the corporation increases." The plan is meeting a great deal of opposition in Congress.

Equipment and Supplies

FREIGHT CARS

THE CANADIAN PACIFIC is inquiring for 750 box cars, 300 coal cars and 150 refrigerator cars.

THE ETHYL GASOLINE CORPORATION has ordered 15 tank cars having a capacity of 3,000 gal., and 9 tank cars having a capacity of 6,000 gal. from the American Car & Foundry Company.

THE CHESAPEAKE & OHIO, reported in the *Railway Age* of June 8 as inquiring for 5,000 hopper cars and 75 flat cars of 50 tons' capacity and 50 stock cars of 40 tons' capacity, has ordered this equipment from the following builders: American Car & Foundry Company, 2,000 hoppers; Pullman-Standard Car Manufacturing Company, 1,500 hoppers; General American Car Company, 1,500 hoppers and 50 stock cars; Bethlehem Steel Company, 75 flat cars.

THE CANADIAN NATIONAL has called for tenders on 250 refrigerator cars, 300 general service cars, 150 sand cars and 400 automobile cars. This is part of the construction program, the financing of which is provided for in the unemployment relief act recently passed by Parliament. In addition, 250 refrigerator cars are to be built in the railroad company's shops. The program also provides a considerable amount of repair work in the railroad's main shops, the latter to provide an additional two days' work per month for the men.

IRON AND STEEL

THE WABASH is inquiring for 5,000 tons of rails.

MISSOURI PACIFIC—The district court has authorized the trustees of this road to purchase 10,000 tons of rails and the necessary fastenings.

THE NEW YORK CENTRAL has ordered from the McClintic-Marshall Corporation about 475 tons of steel for a station at Syracuse, N. Y.

THE CHICAGO & NORTH WESTERN has ordered 160 tons of structural steel for a bridge at West Allis, Wis., from the McClintic-Marshall Corporation.

THE WABASH has ordered 8,500 tons of structural steel for a bridge at St. Charles, Mo., dividing the order between the American Bridge Company and the Mt. Vernon Bridge Company.

THE STATEN ISLAND RAPID TRANSIT RAILWAY COMPANY, a subsidiary of the Baltimore & Ohio is asking for bids until July 5, at the office of H. A. Lane, chief engineer, Baltimore, Md., for furnishing and delivering about 750 tons of structural steel, for use in nine bridges involved in the elimination of grade crossings, Port Richmond, Staten Island, N. Y.

Supply Trade

F. W. Booss, formerly of the Chicago office of the **Gould Storage Battery Corporation,** Depew, N. Y., will on July 1 take charge of the Los Angeles territory, with headquarters at 2678 Lacy street, Los Angeles, Calif.

W. W. Spangler, treasury manager, northwestern district, with headquarters at Chicago of the **Westinghouse Electric & Manufacturing Company,** has been appointed credit manager, with headquarters at East Pittsburgh, Pa.

Charles R. Robinson, vice-president in charge of railroad sales of the **Inland Steel Company,** Chicago, has been elected first vice-president and general manager of sales, to succeed **Edward M. Adams,** deceased. Mr. Robinson started his business career in 1890 as a salesman of tool steel for Park Brother & Co. In 1900, he entered business for himself, handling various steel products on a brokerage basis. In 1904, he entered the employ of the Inland Steel Company as a salesman, becoming assistant general manager of sales in 1906. In October, 1908, he resigned from the Inland Steel Company to become district sales manager for the Lackawanna Steel Company at Chicago, and in 1910 was transferred to New York as general manager of sales. In the following year his headquarters were transferred to Buffalo, N. Y. He held the latter position until 1918, when he was elected vice-president in charge of sales. In January, 1922, he returned to the Inland Steel Company, coincident with that company's entrance into the rolling of standard section heavy T-rails, becoming vice-president in charge of railroad sales, which position he has held until his recent election. He became a director of the Inland Steel Company in 1924 and president of the Inland Tar Company in 1930.

Charles R. Robinson

OBITUARY

J. W. Chandler, Louisville, Ky., representative of the Union Spring & Manufacturing Company, New Kensington, Pa., died on June 12.

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MODERN REPAIR PRACTICE

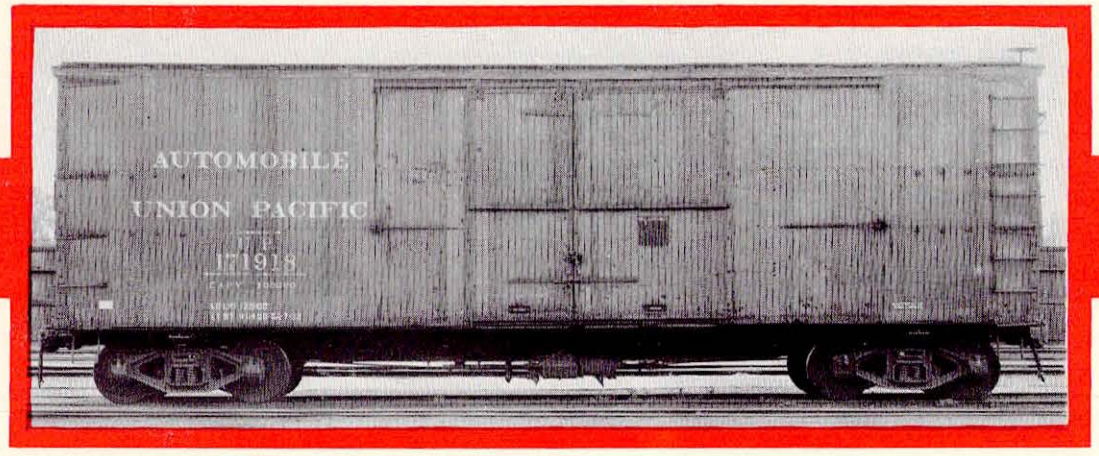
WOOD BOX CARS BECOME ALL STEEL CARS

by the application of

YOUNGSTOWN STEEL SIDES

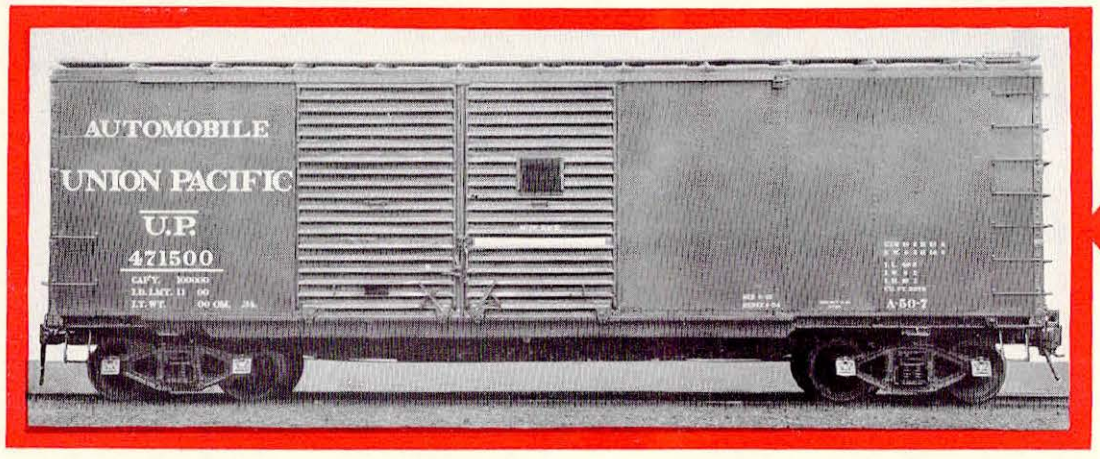
(PATENTED)

CARS OF THIS TYPE



From This

ARE REBUILT INTO ALL STEEL BOX OR AUTO



To This

Inside width and height increased to present day requirements. Utilizing the original underframes, trucks and ends, also existing roof if serviceable.

YOUNGSTOWN STEEL DOOR CO.

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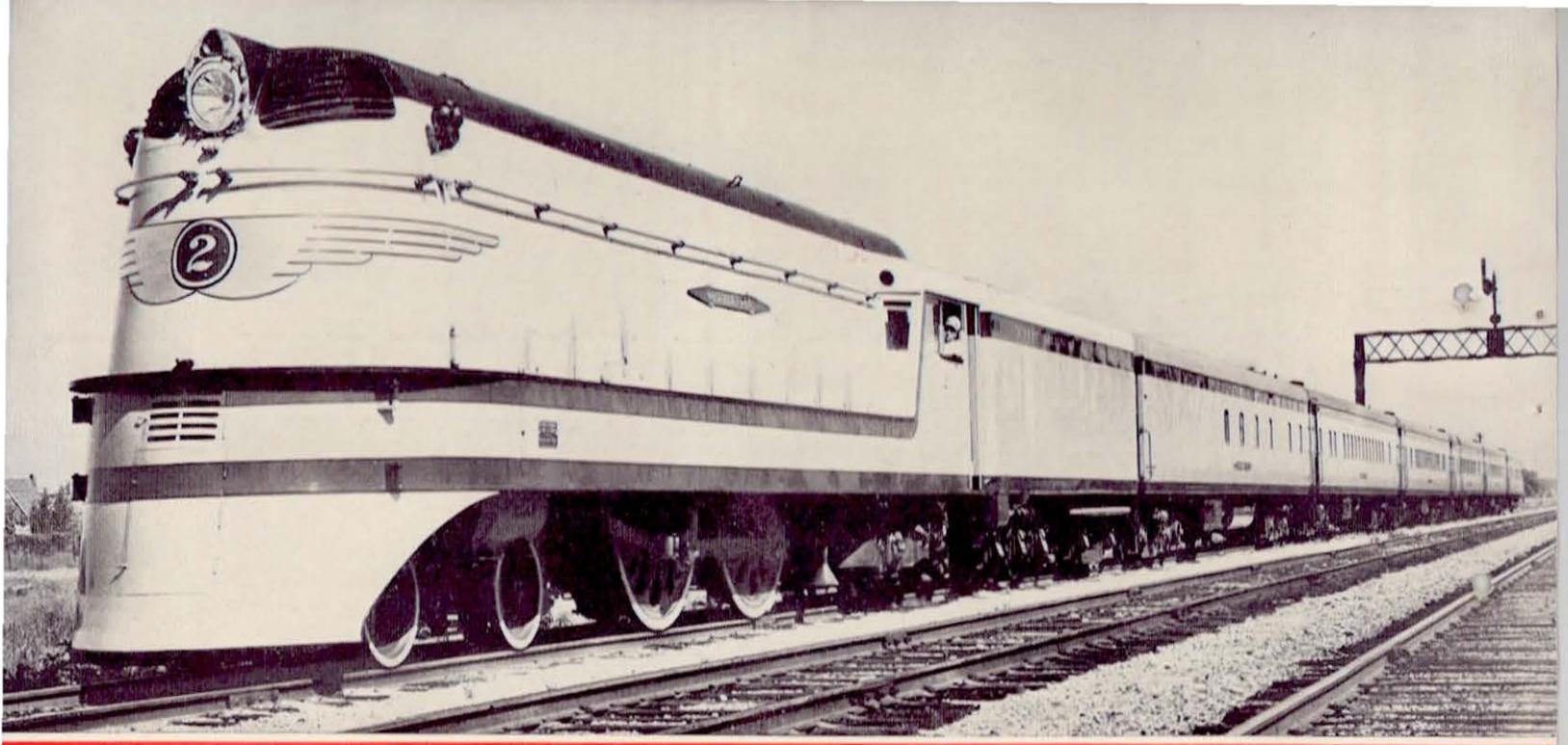


HIAWATHA SPEED

The new "Hiawatha" was given a trial trip between Milwaukee and New Lisbon on May 15th—not as a speed test but just by way of getting from Watertown to New Lisbon at a pace at which it could travel comfortably . . . Train left Milwaukee at 9:40 A. M. Stopped at Watertown to look at engine, which was running cool. With this stop passed Portage 11:03 A. M., one minute less than schedule . . . Maximum speed 97.3 miles per hour. Arrived at New Lisbon at 11:33 A. M. Schedule calls for thirty-four minutes. Maximum speed 112.5 m.p.h.

From Milwaukee to Portage is 92.9 miles. From Portage to New Lisbon is 43.1 miles.

AMERICAN LOCOMOTIVE COMPANY

30. CHURCH ST. NEW YORK. N.Y.

ALCO

Construction

BALTIMORE & OHIO.—Bids were received on June 28 for grading, masonry and other heavy construction in connection with elimination of the grade crossing at Salamanca-Ellicottville (part 1) State Highway No. 1305 and Rock City Hollow road, Peth, N. Y.

BALTIMORE & OHIO.—A revised estimate of $157,700 in connection with the elimination of the grade crossing of this road on the Scottsville-Mumford State highway in the town of Wheatland, N. Y., has been approved by the New York Public Service Commission. The State Department of Public Works has also approved the revised estimate of cost.

MISSOURI-KANSAS-TEXAS.—This road is planning an extensive steel bridge repair program which will involve the replacing and repairing of corroded members on about 3,500 lin. ft. of metal bridges, the replacing of pins and defective rivets on an additional 2,100 lin. ft. of metal bridges, the replacement of a 60-ft. deck-girder single-track span at Houston, Tex., with an 84-ft. deck-girder span, repairs to five turntables, the replacement of 4,300 lin. ft. of timber decks, and the painting of about 12,000 lin. ft. of girder and truss spans. In this program superstructures are to be repaired by riveting, the work being of such nature that very little drilling will be required as the parts are to be replaced in kind. The repairs to turntables will be of the same type, except that on three of the structures the center bearings are to be replaced. On all painting work to be done under this program, the members are to be cleaned first with scrapers and by sand blasting. All the work is to be done by company forces.

PENNSYLVANIA—Rice Brothers, Belmont, Ohio, were the low bidder on the project for relocating a portion of the Pennsylvania trackage in the vicinity of the Mohawk reservoir near Brinkhaven, Ohio. This project is being handled by the U. S. Engineer office, Zanesville, Ohio.

WABASH.—A contract for the fabrication and erection of the super-structure of the bridge which this company has under construction across the Missouri river at St. Charles, Mo., has been awarded to the American Bridge Company, Pittsburgh, Pa., and the Mt. Vernon Bridge Company, Mt. Vernon, Ohio, these companies having tendered jointly the low bid of $1,041,098. The work under this contract includes the fabrication and erection of a cantilever channel span 624 ft. long, with an anchor arm 429 ft. long on the east, and an anchor arm 273 ft. long on the west; a simple truss span 312 ft. long; a 3,945-ft. approach on the east, consisting of girders on steel bents; and a 2,286-ft. approach on the west also consisting of girders on steel bents.

WHEELING & LAKE ERIE—Bids for the relocation of 9.33 miles of this road in the vicinity of the Beach City reservoir in Ohio have been received by the U. S. Engineer office, Zanesville, Ohio, and are scheduled to be opened on June 28.

Financial

CHICAGO, ROCK ISLAND & PACIFIC.—*R. F. C. Loan.*—The Reconstruction Finance Corporation has increased from 4 to 6 per cent the interest rate on this company's loans amounting to $13,718,700 from the corporation because of a disagreement between it and the trustees regarding the employment of Otis F. Glenn, former United States Senator from Illinois, as special counsel at a salary of $10,000 a year. The interest rate had been reduced under a supplementary agreement such as had been made with many roads which stipulated a readjustment of officers' salaries and is understood to have provided against the appointment of any officer at a salary in excess of $4,800 without the consent of the corporation.

GRAND TRUNK WESTERN.—*Car Ferry Control.*—The Interstate Commerce Commission has dismissed the application of this company for approval of continuance of its control, through stock ownership, of the Grand Trunk Milwaukee Car Ferry, the Commission holding that its approval is unnecessary.

MAINE CENTRAL.—*R. F. C. Loan Extended.*—The Interstate Commerce Commission has authorized the extension to December 1 of a loan of $2,449,730 to this company by the Reconstruction Finance Corporation which matured June 1.

MINNEAPOLIS & ST. LOUIS.—*Abandonment.*—The Interstate Commerce Commission has authorized the receivers of this company to abandon that part of its line extending from Martinsburg, Iowa, eastward to Junction Switch, 22.4 miles.

NEW YORK CENTRAL.—*T. & O. C. Bonds.*—A group of security houses, including the First Boston Corporation and Brown, Harriman & Co., have offered at 99, subject to I. C. C. approval, an issue of $12,500,000 of Toledo & Ohio Central 3¾ per cent refunding and improvement mortgage bonds, to be guaranteed by the New York Central.

SOUTHERN.—*Abandonment.*—The Interstate Commerce Commission has authorized this company to abandon a line extending from Danville, Va., to Lima, 3.5 miles.

Average Prices of Stocks and of Bonds

	June 25	Last week	Last year
Average price of 20 representative railway stocks..	33.91	34.80	43.20
Average price of 20 representative railway bonds..	76.06	75.49	78.18

Dividends Declared

Atchison, Topeka & Santa Fe.—$2.00, payable September 3 to holders of record July 31.

Kansas City, St. Louis & Chicago.—6 Per Cent Preferred Guaranteed, $1.50, quarterly, payable August 1 to holders of record July 17.

Michigan Central.—$25.00, semi-annually, payable July 31 to holders of record July 20.

Norfolk & Western.—$2.00, quarterly, payable September 19 to holders of record August 31; Adjustment Preferred, $1.00, quarterly, payable August 19 to holders of record July 31.

Northern Central.—$2.00, semi-annually, payable July 15 to holders of record June 29.

Piedmont & Northern.—75c, quarterly, payable July 10 to holders of record June 29.

Richmond, Fredericksburg & Potomac.—Common Voting, $2.00, semi-annually; Common Non-voting, $2.00, semi-annually; Dividend Obligation, $2.00, semi-annually, all payable June 29 to holders of record June 22.

Railway Officers

EXECUTIVE

L. P. Bergman, superintendent of transportation and traffic for the Railway Express Agency, with headquarters at San Francisco, has been appointed assistant to vice-president, Western department, with the same headquarters, succeeding **B. L. Crawford,** promoted. Mr. Bergman's appointment was effective June 1. **Albert W. Hayes,** division superintendent at Omaha, Neb., has been appointed assistant to vice-president of the traffic department at the executive headquarters at New York City, effective May 1, succeeding **C. N. Davenport.**

FINANCIAL, LEGAL AND ACCOUNTING

Hugh A. Toland, auditor of the Union Pacific Railroad, has been promoted to general auditor of the Union Pacific System, with headquarters as before at Omaha, Neb., succeeding **G. E. Bissonnet,** who has retired, effective July 1, under the provisions of the company's pension regulations. **Curtis J. Merriam,** assistant auditor of the Union

Hugh A. Toland

Pacific Railroad, has been promoted to auditor, to succeed Mr. Toland, and has been replaced by **Edward J. Doolin,** auditor of miscellaneous accounts of the Union Pacific Railroad. **John K. Finlayson,** chief clerk to the auditor of miscellaneous accounts, has been appointed auditor of miscellaneous accounts, to succeed Mr. Doolin.

Mr. Toland was born in Chippewa Falls, Wis., and first began railroading in 1899. He entered the service of the Union Pacific in 1908 as division accountant at Denver, Colo., then serving successively as division accountant, chief clerk to superintendent and special accountant, being appointed chief clerk to the auditor of disbursements at Omaha in 1910. Seven years later Mr. Toland was appointed assistant auditor of the Oregon Short Line (a unit of the Union Pacific System), with headquarters at Salt Lake City, Utah,

(*Continued on page 1058*)

Railway annual report advertising appears on second left-hand page

BARCO PRODUCTS

ON THE LATEST M

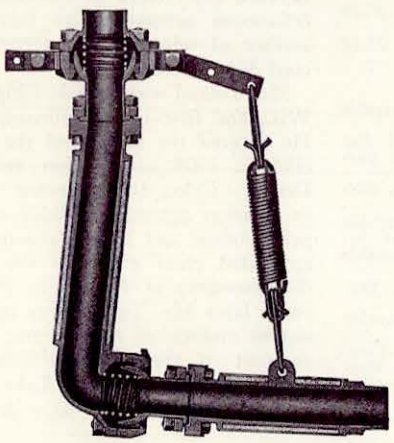
BARCO Products were applied on the majority of steam locomotives and passenger cars built during the past few years.

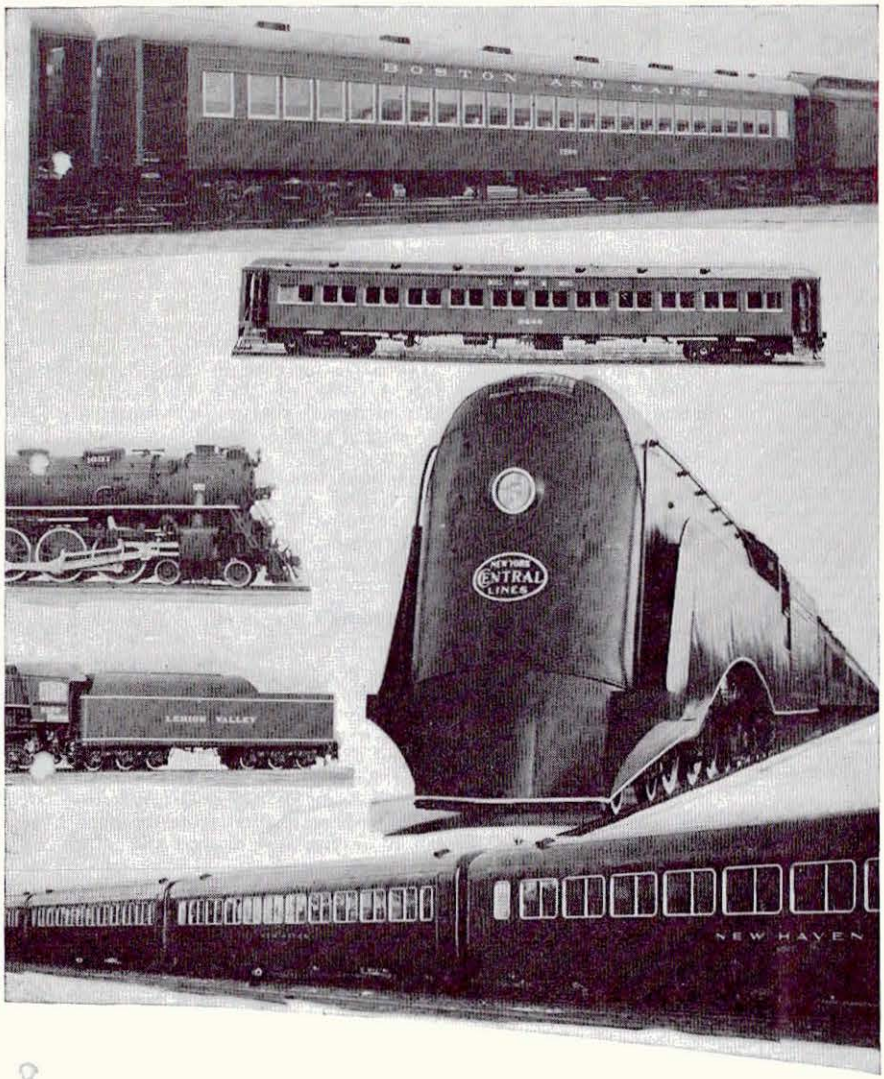
Heavy Articulated power — high pressure, dual service locomotives — modern, streamlined engines and trains — de luxe, air-conditioned passenger coaches, equipped with BARCO products to insure maximum efficiency, dependability and economy.

The significance of this unusual endorsement becomes instantly apparent when one realizes that the trend of purchases is limited to equipment which will help to establish new standards of operation.

BARCO Steam Heat Connections on rear of tenders and between passenger cars deliver steam at maximum pressures without failures or leaks. They contribute to the comfort of the passengers and good appearance of the trains at lowest cost.

BARCO Steam Heat Connections





ODERN EQUIPMENT

BARCO Flexible Joints in locomotive piping have proven to be an indispensable factor in the prevention of failures and delays.

BARCO 3-V engine and tender connections are standard for air, oil and steam on the majority of the large leading railroads. They provide the most reliable service at minimum cost.

BARCO Power Reverse Gears contribute to the efficiency of locomotive operation. They insure close adjustment and accurate cut-off with minimum attention.

BARCO Low Water Alarms are guarding huge investments in modern power and contributing to the safety of crews and workmen. Savings effected in locomotive maintenance quickly pay for the small initial investment. Complete installations of BARCO Products offer maximum efficiency and economy.

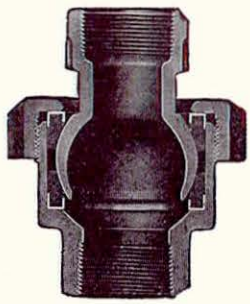
Barco Manufacturing Co.

1801 Winnemac Avenue, Chicago, Illinois

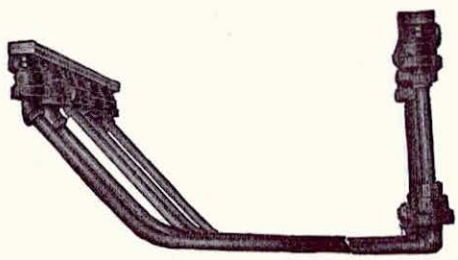
THE HOLDEN CO., LTD.

In Canada
Montreal—Moncton—Toronto

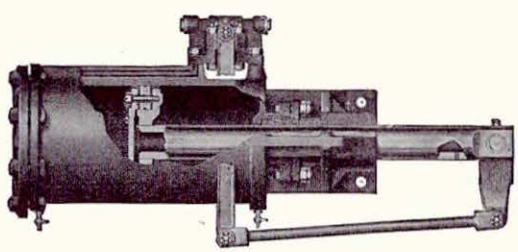
In Canada
Winnipeg—Vancouver



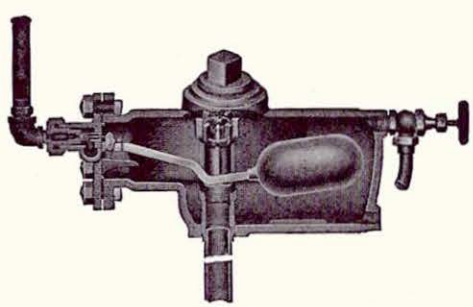
BARCO Flexible Joints are saving thousands of dollars annually by eliminating leaks and reducing replacements on locomotives and cars, and in engine terminals, shops and coach yards.



BARCO 3-V
Engine-Tender Connections



BARCO Type M-1 Air Cushioned
Power Reverse Gear



BARCO
Low Water Alarm

The Baltimore and Ohio Railroad Company

SUMMARY OF ANNUAL REPORT FOR YEAR 1934

The Annual Report of the President and Directors for the year 1934 is being mailed to Stockholders of record. This report summarized in part shows the operating results and other matters of interest as follows:

CONDENSED INCOME ACCOUNT

	Year 1934	Compared with 1933 * Increase † Decrease
Operating Revenues	$135,539,395.28	*$3,747,142.30
Operating Expenses	99,337,784.12	*8,968,083.71
Net Operating Revenue	$36,201,611.16	†$5,220,941.41
Taxes, Equipment & Joint Facility Rents, etc.	12,523,671.70	†49,679.73
Net Railway Operating Income	$23,677,939.46	†$5,171,261.68
Other Income from Interest, Rents, etc. (Net)	5,109,571.47	*38,669.78
Income Available for Fixed Interest and Other Charges	$28,787,510.93	†$5,132,591.90
Interest and Other Fixed Charges	32,613,262.96	†1,102,067.92
Net Income or *Deficit*	*$3,825,752.03*	†$4,030,523.98

CONDENSED BALANCE SHEET

ASSETS

Investments:		
Investment in Road and Equipment		$981,388,267.09
Investment in Separately Operated Subsidiary and Affiliated Companies		90,743,557.10
All Other Investments		107,869,063.39
Total Investments		$1,180,000,887.58
Current Assets:		
Cash and Special Deposits	$10,223,446.56	
Material and Supplies	9,116,686.73	
All Other	11,371,360.40	
Total Current Assets		30,711,493.69
Deferred Assets and Unadjusted Debits		4,856,747.01
Total		$1,215,569,128.28

LIABILITIES

Capital Stock:		
Preferred Stock	$58,863,161.95	
Common Stock	256,295,347.92	
Total Capital Stock		$315,158,509.87
Unmatured Interest Bearing Obligations:		
Bonds and Other Obligations Issued or Assumed	$637,464,634.27	
Unassumed Obligations of Operated Subsidiaries	43,138,200.00	
Capitalized Leaseholds	10,450,400.00	
Total Unmatured Interest Bearing Obligations		691,053,234.27
Current Liabilities:		
Audited Accounts and Wages Payable	$9,373,136.46	
Accrued Interest Charges	9,014,011.39	
All Other	5,781,806.10	
Total Current Liabilities		24,168,953.95
Deferred Liabilities and Unadjusted Credits:		
Accrued Depreciation—Equipment	$85,878,165.17	
Inter-Company Non-negotiable Accounts	8,392,054.15	
All Other	7,286,635.57	
Total Deferred Liabilities and Unadjusted Credits		101,556,854.89
Corporate Surplus		83,631,575.30
Total		$1,215,569,128.28

Review of Operations

Operating revenues increased $3,747,142.30, or 2.84%, over 1933. Revenue from freight traffic increased $2,918,167.45, or 2.57%, while revenue tons carried increased 5.37% and revenue tons one mile increased 4.22%. Revenue from carriage of passengers increased $349,236.73, or 3.56%, while passengers carried and passengers carried one mile increased 9.34% and 7.06%, respectively. The increase in passenger business is due, in part at least, to improved service and the more comfortable mode of transportation afforded in air-conditioned coaches. Other transportation revenue from carriage of mail and express and other sources increased $479,738.12, or 5.57%.

The total operating expenses was $99,337,784.12, an increase of $8,968,083.71, or 9.92% over 1933. The total maintenance charges was $39,822,790.37, an increase of $4,871,770.51, or 13.94%. The increase in maintenance of way was $844,935.31, and in maintenance of equipment $4,026,835.20, of which latter $1,630,705.06 was due to increased charges account of depreciation of equipment effective July 1, 1933, and the remainder to larger expenditures in the general repair of equipment. Transportation expenses increased $3,674,057.44, or 8.39%. The largest single item of increase in transportation expenses was for fuel for locomotives of $2,395,788.56 caused chiefly by the increased price due to application of code regulations under the National Industrial Recovery Act.

Increased Expenses

In addition to the expense of handling the increased traffic of the year, the important factors bearing on the operating costs of the year were: increase in cost of fuel due to increased price (approximately) $2,400,000; increase in prices paid for materials (conservatively estimated) $1,000,000; increase in rates of pay incident to restoration on July 1, 1934, of 2½% of the 10% theretofore deducted, $850,000; increased charges for depreciation of equipment, $1,630,000, being a total of $5,880,000.

On July 1, 1934, there was restored 2½% of the 10% deduction in employees' compensation that had been in effect since February 1, 1932. On January 1, 1935, an additional 2½% was restored and on April 1, 1935, the full 10% was restored. It is estimated that the increase in expenses for the year 1935 over 1934 account of the restoration of wages to the full basic rate will be $4,500,000.

Net Income

Net revenue from railway operations decreased $5,220,941.41, or 12.60%, and after deducting charges for railway tax accruals and charges for equipment and joint facility rentals, there remained $23,677,939.46 as net railway operating income. There was an increase in other income of $277,111.09 and a net decrease in deductions from income of $863,626.61, principally in interest charges. The net deficit for the year was $3,825,752.03, which was after a charge to expenses of $7,583,759.43 for depreciation of equipment, indicating a cash realization from the operations of the year of $3,758,007.40 in excess of interest and other charges.

Changes in Capital Account

There was a net decrease in the Company's investment of $6,348,548.54, accounted for by net reduction in property investment of $5,854,767.21 for retirement of obsolete equipment and of $493,781.33 in other investments, due to the revaluation, readjustment, and transfers of accounts. There was a net increase in unmatured interest bearing obligations outstanding of $6,679,414.65 occasioned by the retirement of some and the refinancng of other obligations. Corporate surplus shows a decline for the year of $8,179,535.03 due to the deficit for the year and various adjustments of investment assets and accounts heretofore mentioned.

Due to financial stringency and continuance of depressed business conditions, capital expenditures for additions and betterments to road property were restricted to pressing necessities and net charges for the year aggregated $279,222.41.

Under arrangements with the Federal Emergency Administrator of Public Works and through the creation of Equipment Trust Series "H" for $1,900,000, the Company will acquire equipment estimated to cost $2,405,090, consisting of 820 steel gondola cars, 1 Diesel electric locomotive, and 2 eight-car stream line passenger trains, one to be constructed of Cor-Ten steel and the other of aluminum alloy.

Federal Legislation

During the year the Federal Co-ordinator of Transportation has undertaken extensive and intensive surveys of various railroad activities, the results of which have been very illuminating and informative and should be productive of much good. With respect to competing forms of transportation, the Co-ordinator in his report of January 21, 1935, stated:

> Highway motor carriers and air carriers are not subject to Federal regulation of the kind now under discussion, and water carriers only in part. The great defect in present Federal regulation of transportation is, therefore, that it does not cover the field. It subjects the railroads to most rigorous supervision, but puts no similar restraint on competitors.

Also in the report the Co-ordinator recommended that the Congress enact legislation to bring about the desired result and in submitting the report to the President and the Congress the Interstate Commerce Commission said: "The bills for the regulation of water and motor carriers we regard as vital. Upon their early enactment depends the preservation and development of a healthy, adequate, co-ordinated system of transport for the Nation . . . ," and urged speedy adoption of legislation.

Shareholders

At the end of the year there were 44,170 registered holders of the Company's stock with an average holding of 71 shares, and

the sympathetic co-operation of each and every shareholder in the solicitation of business for the Company's lines is earnestly desired and respectfully requested.

The President and Board of Directors again record their appreciation of the loyal and efficient co-operation and support of officers and employees in the conduct of the Company's affairs throughout the year.

DANIEL WILLARD,
President.

[Advertisement]

News (Railway Officers)

(*Continued from page 1056*)

and in 1919 he was assigned to the office of the controller at New York. In 1922 he was appointed assistant auditor at Omaha, which position he continued to hold until his recent appointment.

Mr. Merriam is a native of Blair, Neb., and entered the service of the Union Pacific in 1892, as an office boy in the disbursements accounting department at Omaha. Later he held various positions in the accounting department, including those of clerk, general clerk, chief clerk, and special accountant, until 1919, when he was named auditor of miscellaneous accounts. He has held the position of assistant auditor since January 1, 1924.

Curtis J. Merriam

Mr. Doolin was born in San Francisco, Cal., and first entered the service of the Harriman lines in 1894, as an office boy on the Southern Pacific at San Francisco. He held various positions in the accounting department of these lines at both Chicago and New York until August, 1918, when he was appointed a statistician in the office of the general auditor of the Union Pacific System at Omaha. Mr. Doolin was appointed auditor of miscellaneous accounts of the Union Pacific Railroad in 1924, which position he held continuously until his recent promotion to assistant auditor.

Edward J. Doolin

Mr. Bissonnet was born on November 5, 1869, at Houston, Tex. He first entered the service of the Harriman lines in 1894, as a clerk on the Houston, East & West Texas (now part of the Texas & New Orleans), being promoted to traveling auditor in the following year. Four years later he was appointed chief clerk of passenger accounts and then auditor of passenger accounts for the Galveston, Harrisburg & San Antonio and the Texas & New Orleans jointly. After serving as an auditor for several units of the Harriman lines, with headquarters at San Francisco, Cal., Tucson, Ariz., and New York, Mr. Bissonnet was appointed assistant to the controller of the Union Pacific and Southern Pacific in July, 1912. In 1913, following the dissolution decree of the Supreme Court, Mr. Bissonnet was appointed assistant controller of the Union Pacific System. In 1918, he was named general auditor of the Union Pacific System, with headquarters at Omaha, which position he held continuously until his retirement.

ENGINEERING

G. L. Staley, acting bridge engineer of the Missouri-Kansas-Texas, with headquarters at St. Louis, Mo., has been appointed bridge engineer.

MECHANICAL

Henry Yoerg, superintendent motive power of the Great Northern, has been appointed general superintendent motive power, with headquarters as before at St. Paul, succeeding **William Kelly,** retired.

OPERATING

J. P. Kiernan, superintendent car service of the Akron, Canton & Youngstown, with headquarters at Akron, Ohio, has been appointed superintendent, with the same headquarters. The position of superintendent car service has been abolished and the duties of that office will be handled by the superintendent.

B. L. Crawford, assistant to vice-president of the Western departments of the Railway Express Agency, with headquarters at San Francisco, has been appointed general manager of the North Pacific department, with headquarters at Seattle, Wash., succeeding **J. E. O'Neill,** who retired on May 31. **R. A. Cox,** superintendent of bureau of organization, San Francisco, has been appointed superintendent of transportation and traffic, with the same headquarters, succeeding **L. P. Bergman,** promoted. **C. N. Davenport,** former assistant to vice-president in charge of traffic at New York, has been appointed superintendent of bureau of organization, with headquarters at San Francisco, succeeding Mr. Cox. The above appointments were effective on June 1. **H. M. Peyton,** general agent at New Orleans, La., has been appointed superintendent of the Nebraska, Wyoming and Iowa division at Omaha, effective April 23, succeeding **A. W. Hayes.**

PURCHASES AND STORES

C. J. Pearce has been appointed district material supervisor on the Southern Pacific, with headquarters at El Paso, Tex., to succeed **J. M. Day,** who has been transferred to Sacramento, Cal., to replace **V. R. Naylor,** whose appointment as general inspector of stores, with headquarters at San Francisco, was noted in the *Railway Age* for June 22.

J. H. Logan, storekeeper on the Southern at Jacksonville, Fla., has been promoted to division storekeeper, with headquarters at Ludlow, Ky., effective July 1, succeeding **E. L. Tavlin,** who has been retired at his own request because of ill health. **B. F. Page** has been appointed storekeeper at Jacksonville to succeed Mr. Logan.

OBITUARY

L. E. Temple, mechanical engineer of the International-Great Northern, with headquarters at Palestine, Tex., died on June 21.

David W. Houston, cashier of the Great Western (a subsidiary of the Great Western Sugar Company), at Denver, Colo., died suddenly on June 18.

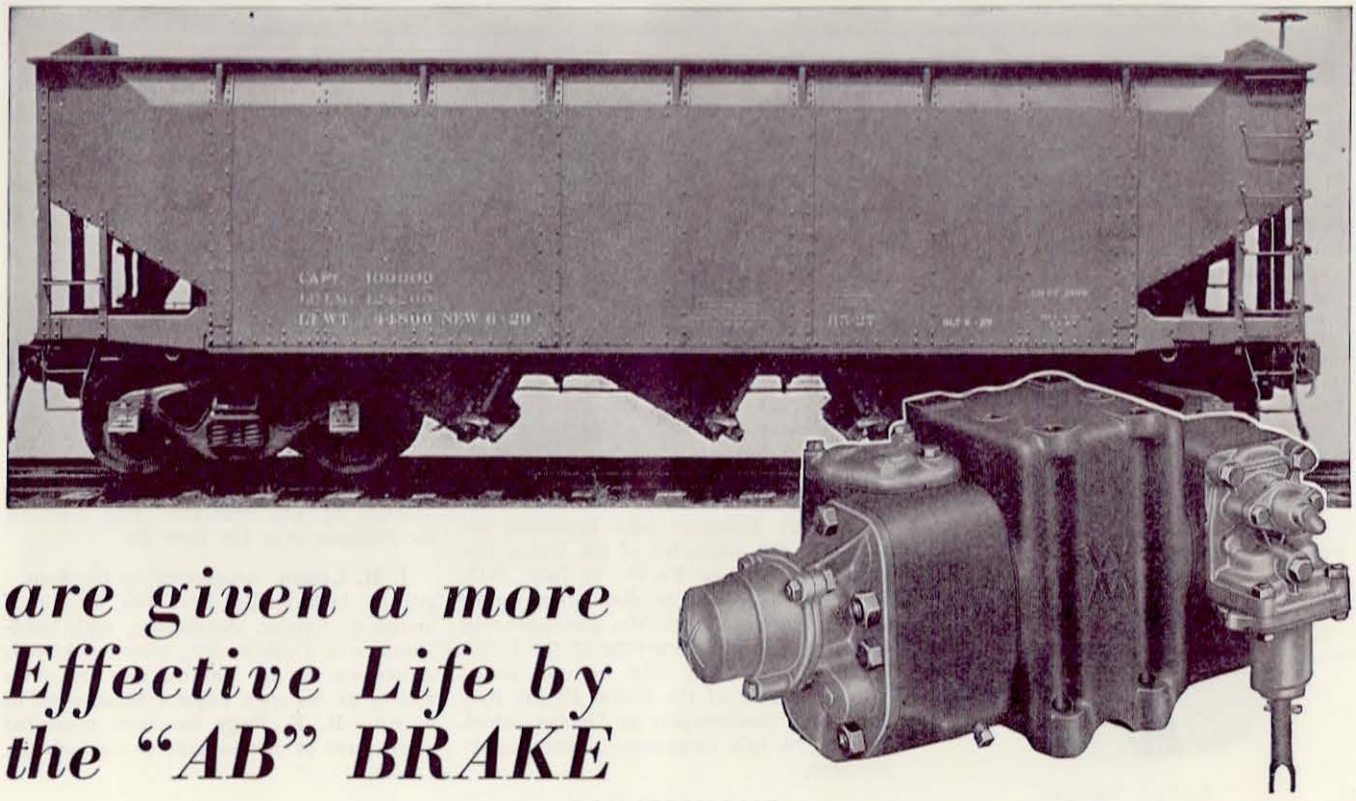
William C. Ranous, general superintendent of transportation of the Minneapolis, St. Paul & Sault Ste. Marie at Minneapolis, Minn., died on June 25.

John T. Conley, formerly general freight agent for the Chicago, Milwaukee, St. Paul & Pacific, with headquarters at Chicago, who left this company in 1918 to engage in other business, died on June 23 at Chicago.

James Sweeney, retired supervisor of track on the Chicago & Eastern Illinois, and treasurer and a past president of the Roadmasters and Maintenance of Way Asscciation of America, died on June 18 at his home in Danville, Ill. Mr. Sweeney retired in 1933 after nearly 60 years of railroad service.

John McMillan, former general manager of telegraphs of the Canadian Pacific, died on June 24 at Montreal after a long illness. Mr. McMillan was 69 years old. He entered the service of the Canadian Pacific telegraph department as construction lineman in 1883 and in January, 1921, he became general manager of telegraphs, from which position he retired in January, 1932.

RECONDITIONED CARS » » » »



are given a more Effective Life by the "AB" BRAKE

IT can be said of mechanical things as of human beings that "We should count time by heart throbs . . . not by shadows on a dial."

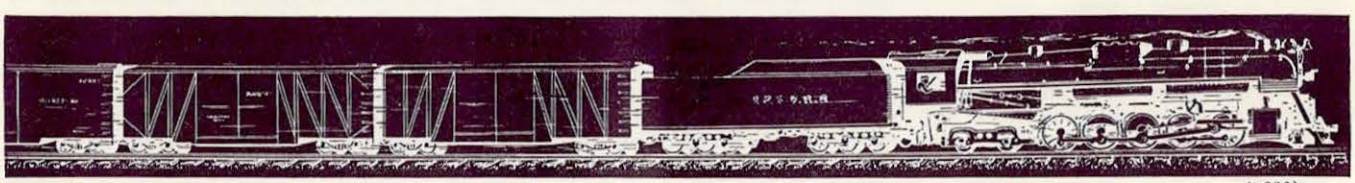
Usefulness is measured not so much by length of life as by depth. It is better to be virile than venerable.

Moreover, all vital personalities have the capacity for impelling less fortunate ones to greater activity, and, by encouraging harmonious united effort to improve society as a whole.

Structural reconditioning of cars will give them *more* life; equipment reconditioning by installation of the "AB" Brake will give a *more effective* life—for individual cars themselves, for their associates not so equipped, and consequently for the whole train.

WESTINGHOUSE AIR BRAKE COMPANY

General Office and Works, Wilmerding, Penna.



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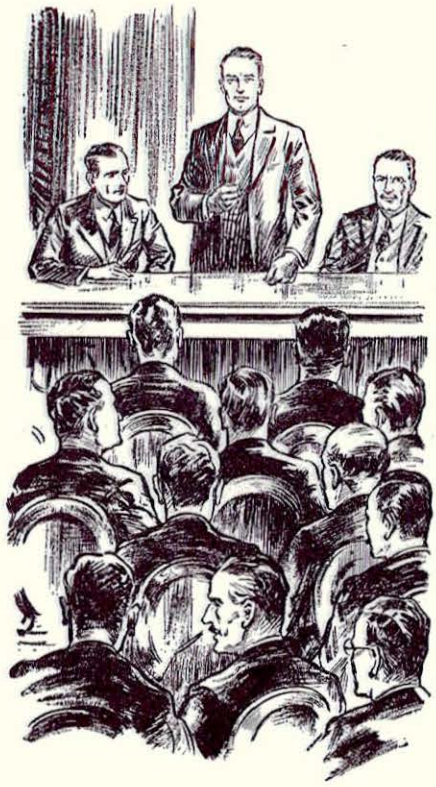
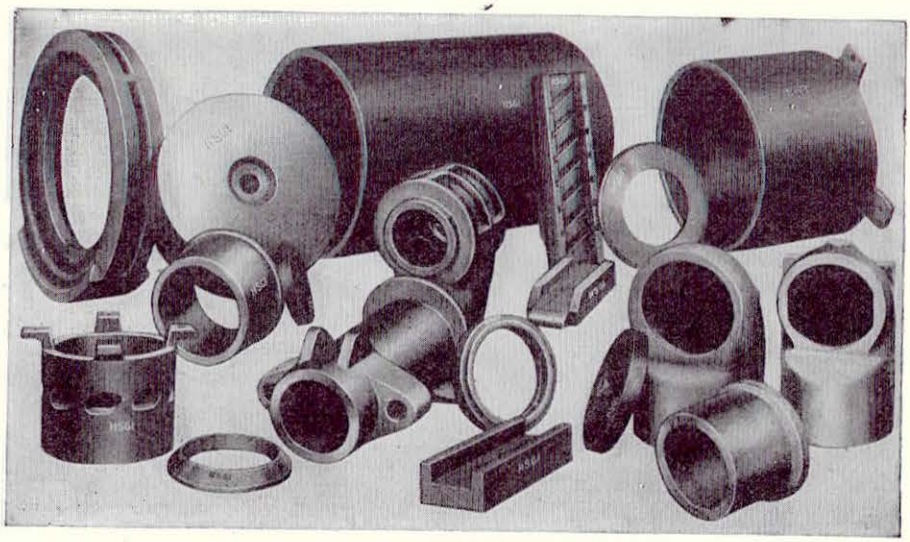




On The Subject of Better Materials

CONSTANTLY increasing speeds, pressures and miles of operation per month have proved that the modern locomotive must be equipped with dependable wearing parts.

HUNT-SPILLER *Air Furnace* GUN IRON has successfully demonstrated its ability to measure up to all of the requirements of modern operation.

Its wear-resisting qualities are helping many railroads to maintain maximum locomotive efficiency, eliminate waste of fuel and reduce maintenance expenses.

Greater economies can be effected by extending its scope of application to all of the parts listed below.

HSGI
Reg. U. S. Trade Mark

Cylinder Bushings
Cylinder Packing Rings
Pistons or Piston Bull Rings
Valve Bushings
Valve Packing Rings
Valve Bull Rings
Crosshead Shoes
Hub Liners
Shoes and Wedges
Floating Rod Bushings

Parts Finished For Application

Dunbar Sectional Type Packing
Duplex Sectional Type Packing for Cylinders and Valves
(Duplex Springs for Above Sectional Packing)
Cylinder Snap Rings
Valve Rings All Shapes

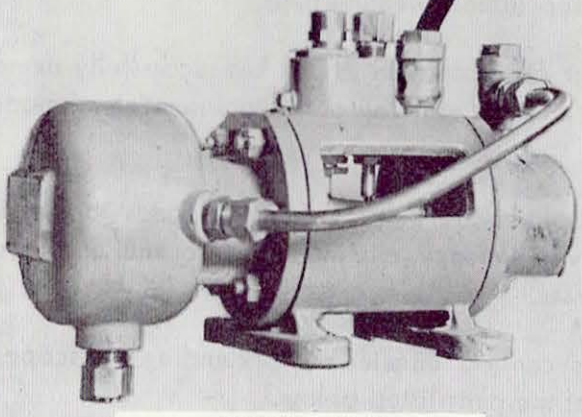
HUNT-SPILLER MFG. CORPORATION
J.G. Platt, Pres. & Gen. Mgr. V.W. Ellet, Vice-President.

Office & Works
383 Dorchester Ave. South Boston, Mass.
Canadian Representative: Joseph Robb & Co., Ltd., 70 North Bank Rd., Montreal, P. Q.
Export Agent for Latin America:
International Rwy. Supply Co., 30 Church Street, New York, N. Y.

HUNT-SPILLER *Air Furnace* GUN IRON

Announcing

DRIFTING VALVE
Applied on top of Boiler



CONTROL UNIT
Applied on top of steam chest

The New ARDCO Automatic Model 10-A DRIFTING VALVE

THIS new, improved ARDCO Drifting Valve is operated by air pressure through a steam operated control valve.

It is completely automatic — 100% foolproof and economical in maintenance. It consists of two simple units, which are rugged, efficient and dependable.

Performance reports show that the new ARDCO Drifting Valve insures efficient lubrication at all times and maximum protection to cylinders, valves, packing and reciprocating parts against damage while the engine is drifting.

The large potential savings in locomotive operation warrant your immediate investigation. Blueprints and details furnished upon request.

The ARDCO Drifting Valve is designed to operate with any type of mechanical or hand operated cylinder cocks. For maximum efficiency and economy we recommend the application of ARDCO Safety Cylinder Cocks. They operate on a principle similar to that of the Drifting Valve and therefore offer an ideal combination.

ARDCO MANUFACTURING CO.
1 Newark St. Hoboken, N. J.

Ardco Railway Devices

Drifting Valves — Cylinder Cocks — Eng. Truck & Trailer Cellars — Rail and Flange Lubricators

THESE K-240 FEATURES will save you money

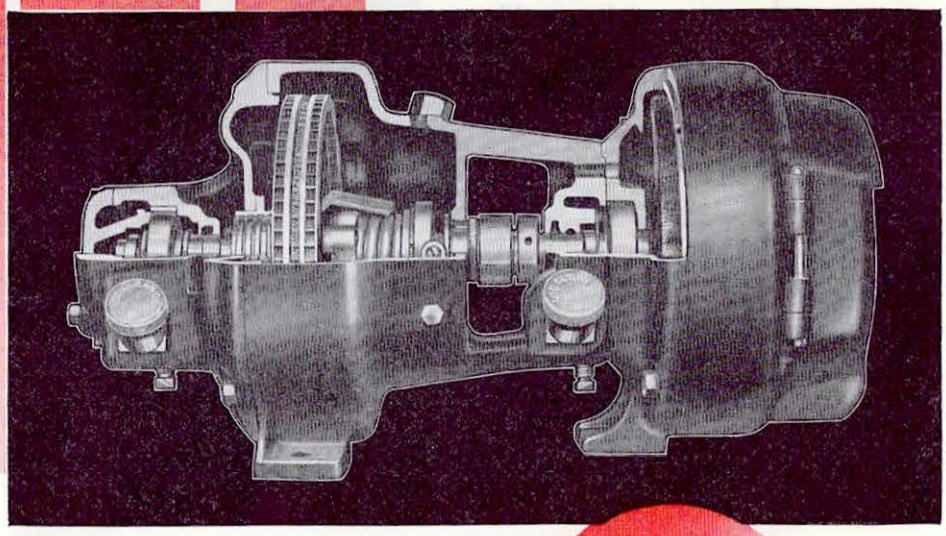
★ Improved Armature Design ★ 40 Bar Commutator ★ Longer Commutator and Brush Life ★ Steady Output ★ Alloy Valve and Valve Cage ★ Accurate, Sensitive Governor ★ Nickel Alloy Turbine Blading ★ Drop Forged Turbine Wheel ★ Rigid High Carbon Shaft ★ Controlled Oil Circulation ★ Better Lubrication and Reduced Oil Consumption ★ Larger Oil Cellars

Immediate and worthwhile economies in headlighting costs will be obtained by the application of the Type "K-240" new standard headlighting turbo-generator. The improved Type "K-240" unit presents all the features of the famous Type "K-2" equipments, *plus* outstanding refinements giving more uniform electrical performance, lower oil expense, longer service life, and far less inspection and maintenance.

A new type armature with 40 bar commutator improves current conditions under the brushes, giving longer commutator and brush life and steadier output. Bearing lubrication is improved by a new type of oil circulation, yet the construction is simplified and oil consumption is reduced. Replenishments are rarely needed between oil changes, for leakage is eliminated. Nickel alloy turbine blading provides lasting protection against corrosion and erosion.

These and many other features combine to assure longer service life and the economies of lessened inspection and service attention.

Type "K-2" equipments now in service may be easily modernized. Improved parts are interchangeable and may be economically applied at any repair period.



Request Bulletin 193

PYLE-NATIONAL

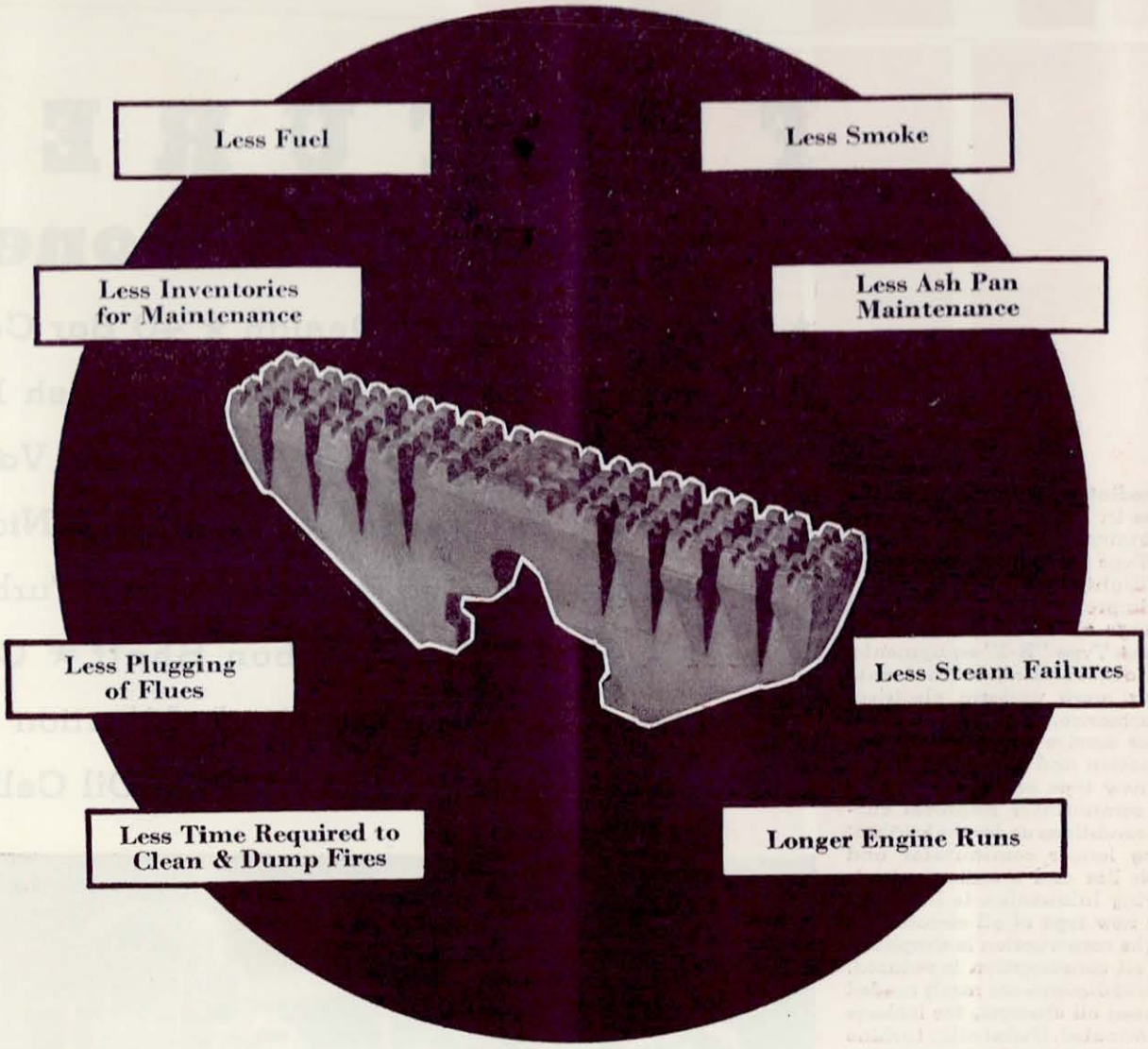
HEADLIGHTS • TURBO-GENERATORS • WIRING APPLIANCES

The Pyle-National Company, 1334-58 North Kostner Avenue, Chicago, Ill.

Offices: New York, Baltimore, Detroit, St. Louis, St. Paul, San Francisco • *Export Department:* International Railway Supply Co., New York • *Canadian Agents:* The Holden Co., Ltd.

RECOGNIZED LEADERSHIP • WIDEST EXPERIENCE • FOR OVER 38 YEARS

FIREBAR ECONOMIES



FIREBARS are a self-liquidating investment. Fuel, operating and maintenance savings with Firebars amortize their cost in four to six months.

Because of savings effected by their use, Firebar Economy Programs instituted on Class 1 railroads months ago are today saving thousands of dollars for these roads.

What Firebars have accomplished on these roads, they can on yours.

WAUGH FIREBAR BETTER FIRES

FIREBAR DIVISION

Waugh Equipment Company

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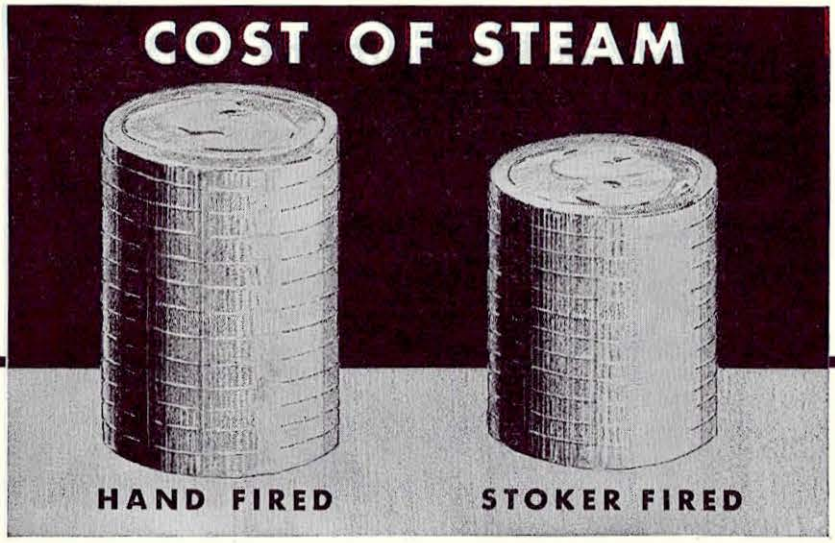
BULLETIN 6

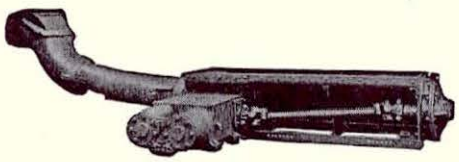


HAND FIRING IS *Expensive* FIRING

If you expect to keep pace with present-day requirements as to speed, etc., it will be necessary to supply the fireman with a coal that will enable him to maintain the required boiler pressure. Such coal usually costs more than mine run or slack.

The mechanical stoker is not concerned about the character of the coal. It will deliver the required amount of steam at pressure regardless.

Steam developed by hand firing costs more than stoker developed steam.



TYPE "BK" STOKER

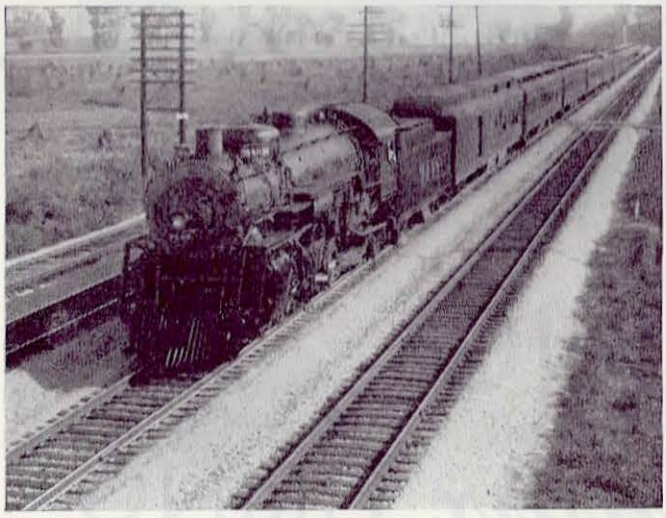
HAND FIRING IS EXPENSIVE FIRING

THE STANDARD STOKER COMPANY, INC.

NEW YORK CHICAGO ERIE

MORE PROOF . . .

DeVilbiss Equipment Spray-Paints for the Santa Fe System . . .



California Limited near Morris, Kansas

The successful experience of leading railroads in their long use of DeVilbiss Spray-Painting Equipment, is the best assurance of the satisfactory results you may expect from this equipment.

These railroads chose DeVilbiss Equipment for better painting, which improves the appearance of cars, locomotives, structures and buildings, and affords greater protection. And because of the speed and efficiency of the spray process, painting costs are lowered.

It will pay you to investigate the latest developments in DeVilbiss Spray-Painting and Canopy Exhaust Equipment.

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Direct sales and service representatives available everywhere.

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1

Train Dispatching Equipment— Among Western Electric's latest contributions to improved train dispatching are . . . New Compact Selector Key . . . Jack Box . . . Selector.

2

Train Dispatching Equipment (Continued) — Balanced Armature Type Magnetic Loud Speaker combines clear reproduction with compact size—handy mounting.

Wire and Cable—For vital circuits — dependable wire and cable. A convenient source for all kinds — including Western Electric Lead Covered Cable.

3

4

Line Construction Materials— From pliers to poles, construction materials of all kinds may be ordered, shipped, and assembled economically and conveniently.

Lamps and Lighting Equipment — A complete selection of quality lamps, fixtures, and glassware is readily available from Graybar. Meets exacting railroad needs.

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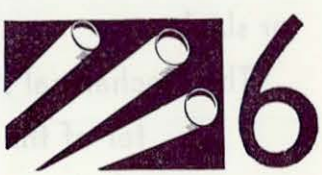

Underground Material—Every type of conduit for railroad use — also conduit fittings, tools, transformers, accessories. No need to seek any further than the nearest Graybar warehouse.

...and 60,000 other quality electrical items for railroads—

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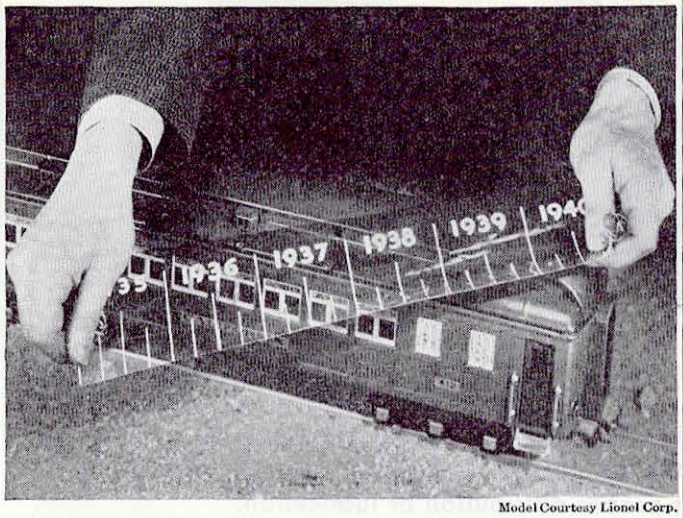
PAINT PROTECTION
over More Years



Model Courtesy Lionel Corp.

ACHIEVEMENTS of the past few years have justified those who have looked to the research laboratories for ways in which to effect economies in railroad operation and maintenance. Out of the laboratory have come stronger, lighter weight non-corrosive metals and metal alloys, flame-proof materials, and more efficient fuels and lubricants. Now, the development of Bakelite Synthetic Resin Finishes points to substantial economies in paint maintenance.

Repeated endurance tests on rolling stock, building interiors and exteriors, and other structures have demonstrated that formulation with Bakelite Resin stretches out the protective life of paints, varnishes and enamels . . . spreads costly application charges over added months and years of service.

Of special value in railroad service are the following properties which Bakelite Resins impart to coatings: unusual toughness, lasting flexibility, quick drying, and high resistance to moisture, sunlight, fumes, and the abrasive action of atmospheric grit.

Leading paint and varnish manufacturers now formulate coach enamels and varnishes, structural coatings, marine paints and all types of building finishes with Bakelite Resin base. It will pay you to investigate these modern high-integrity coatings. Write for booklet 24S, "Bakelite Synthetic Resins".

BAKELITE CORPORATION, 247 Park Avenue, New York
CHICAGO OFFICE, 43 East Ohio Street
BAKELITE CORPORATION OF CANADA, LTD., 163 Dufferin Street, Toronto

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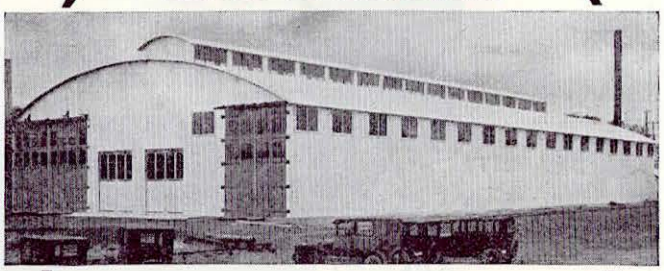
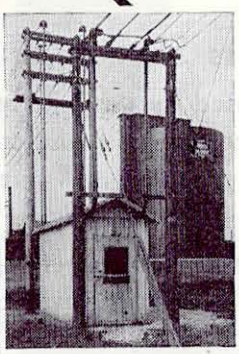
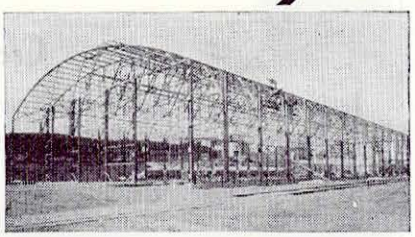
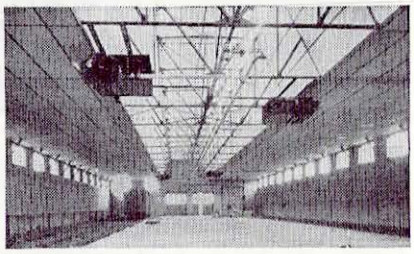
MADE ENTIRELY OF STEEL

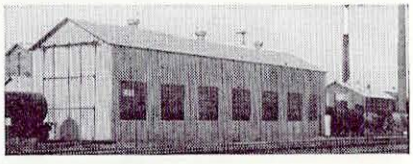
BUTLER



READY-MADE
STEEL BUILDINGS





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These . . . and many other railway structures . . . are now ready-made of steel . . . fit into railway economy programs better than any other fire-safe type of construction.

Standardized unit design facilitates quick assembly on location, enlarging, taking down and re-erection . . . complete, ready-made materials in orderly arrangement promotes quick installation without interruption . . . permanence is inwrought in both materials and structural design.

The standardized unit design of Butler Ready-Made Steel Buildings is flexible. **Butler engineers gladly collaborate to incorporate the ideas of railway engineers to fulfill particular requirements.**

BUTLER MANUFACTURING COMPANY

1247 Eastern Ave.
KANSAS CITY, MO.

947 Sixth Ave., S. E.
MINNEAPOLIS, MINN.

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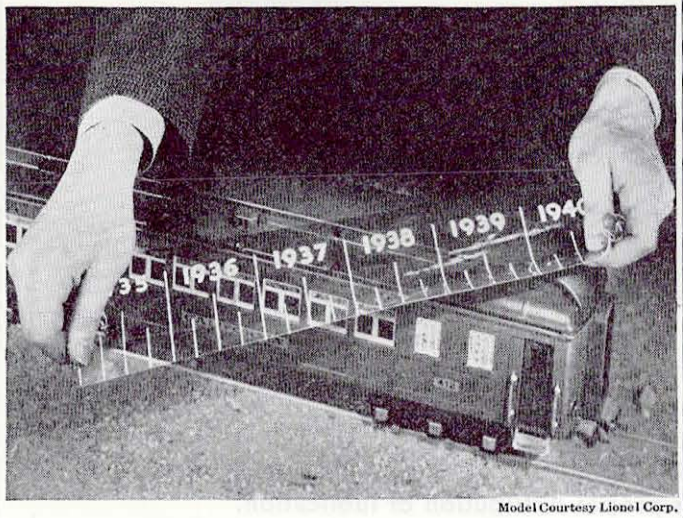

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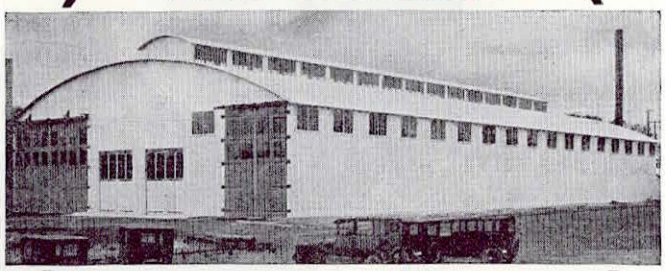

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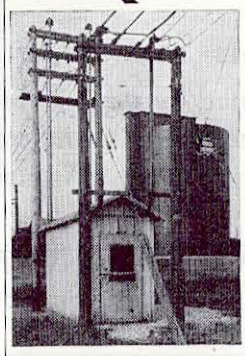
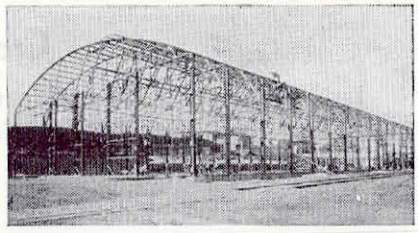

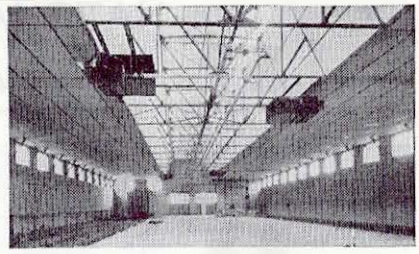

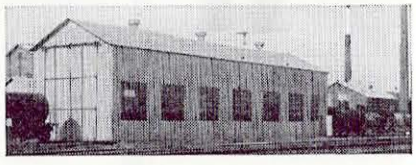

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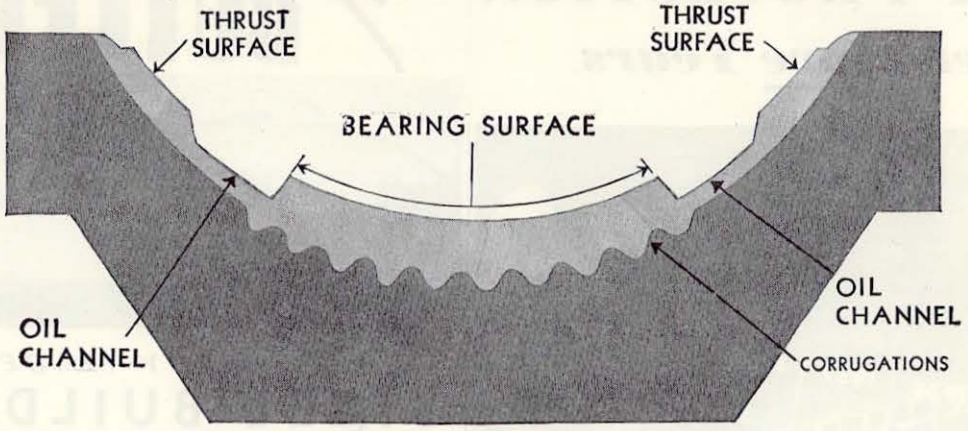

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Overcomes loose and cracked linings.
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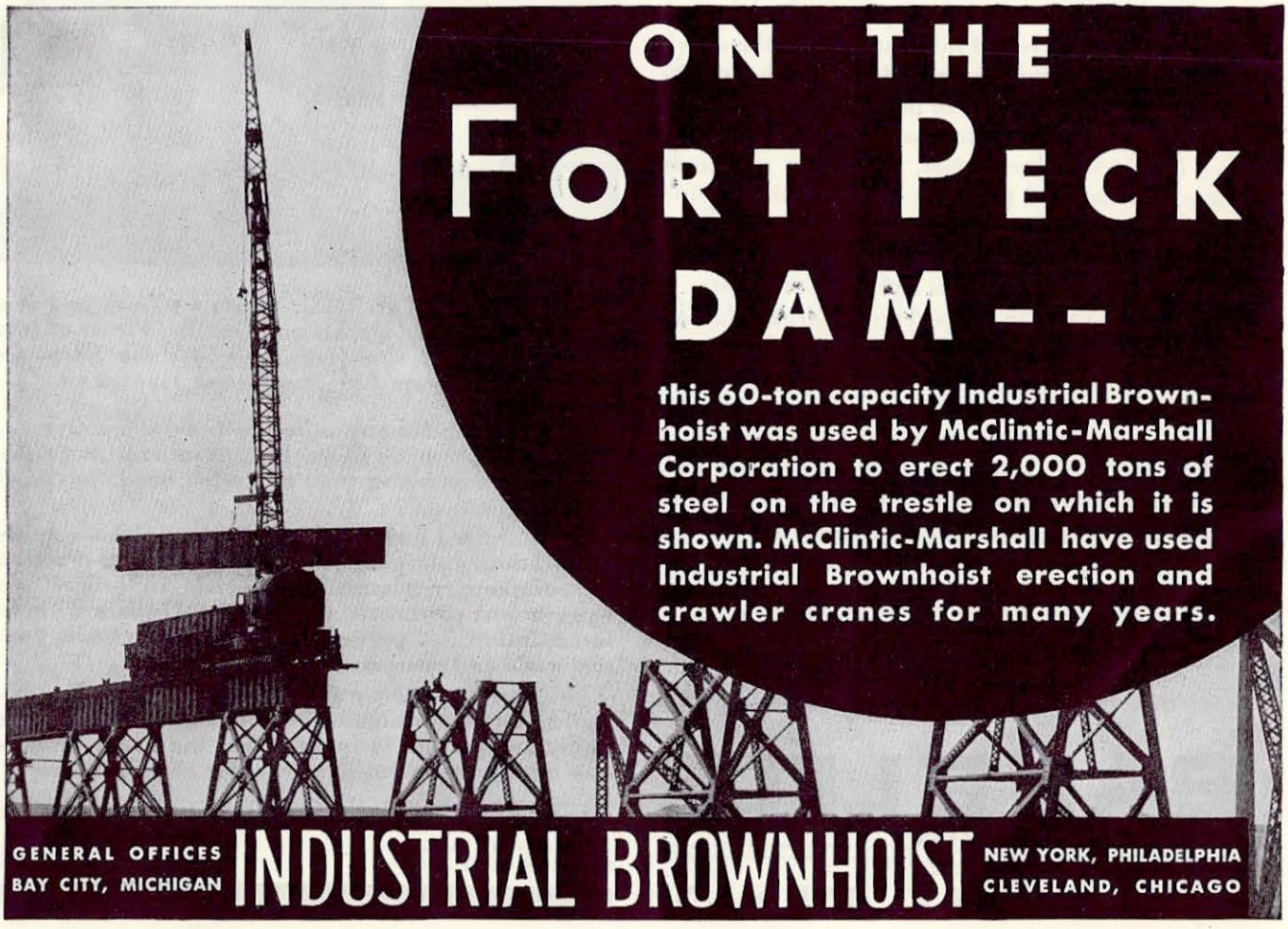

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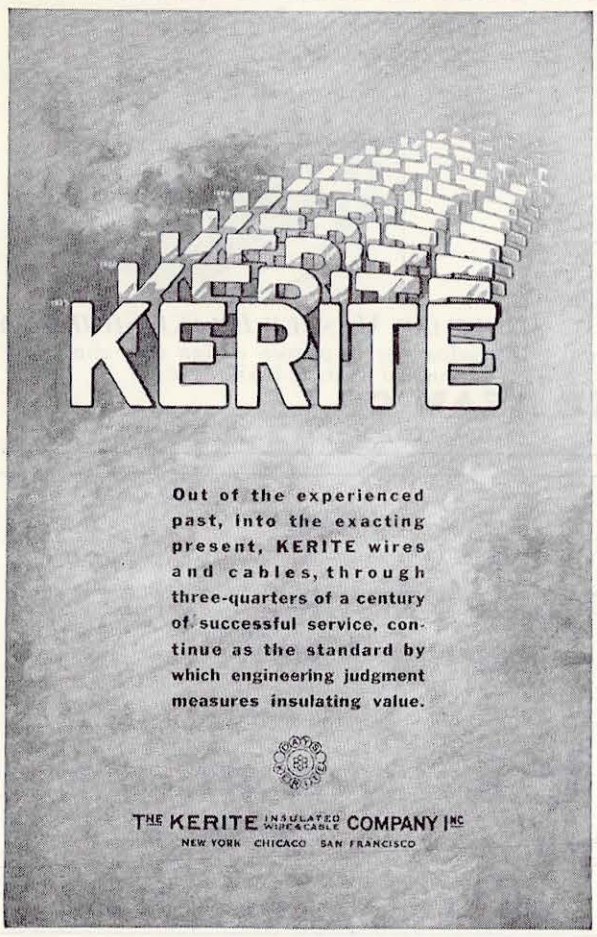
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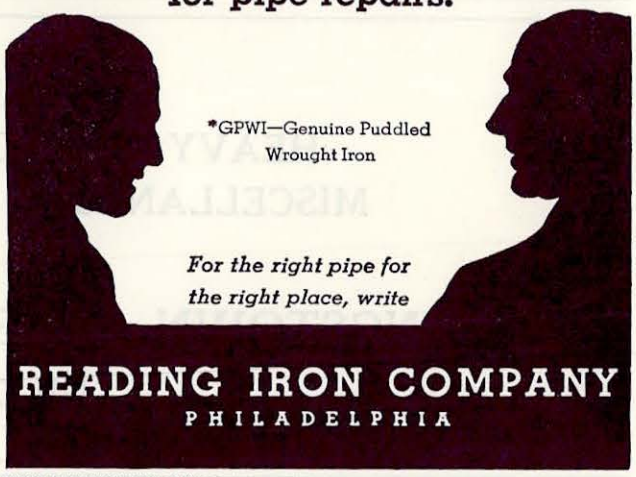
"She needs Reading **GPWI*** Pipe, like our other engines. Then she won't be laid up for pipe repairs."



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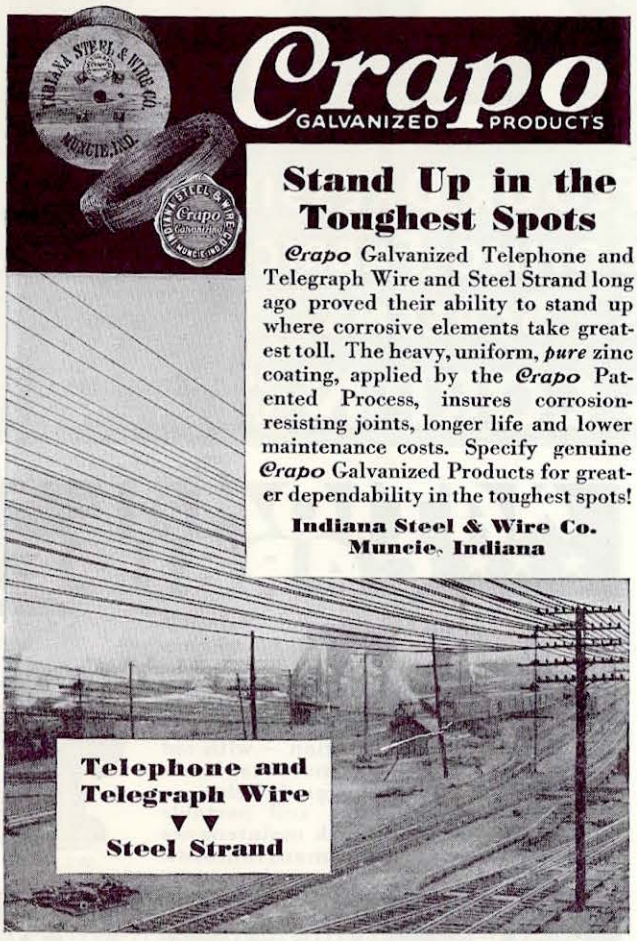
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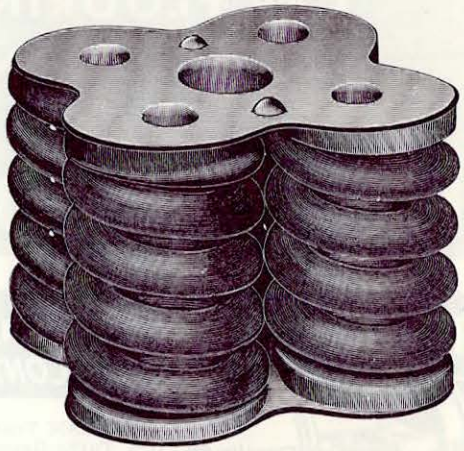

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WE MAKE ANY SIZE AND HEIGHT REQUIRED AND SUITABLE FOR ANY CAPACITY CARS

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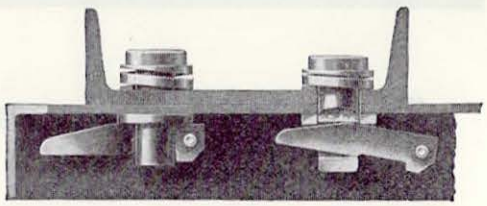

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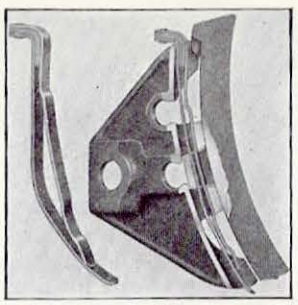
A simple and effective means of securing angles or other suitable shapes to the spring plank.

All shocks and vibrations absorbed by the spring in tension. Double locked pin.



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A spring key of proven design that eliminates vibration and wear on brake heads.

BUFFALO BRAKE BEAM CO.

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HEAVY OR LIGHT CAR REPAIRS
MISCELLANEOUS CAR REPAIR PARTS

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Type R-4

The Sunbeam Four-Pole Turbo-Generator has a wave-wound armature and four brushes that insure freedom from voltage ripple. A responsive governor maintains constant speed and voltag

SUNBEAM Train Control Turbo-Generators operate at constant speed, insuring close voltage regulation. Designed especially to meet the critical demands of train control, they effect great economy in steam and maintenance costs. Their performance in actual use demonstrates their reliability over long periods of service. Write for further details.

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Y-199 Handy Light

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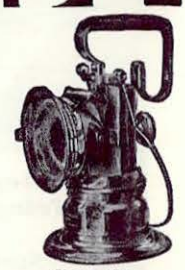

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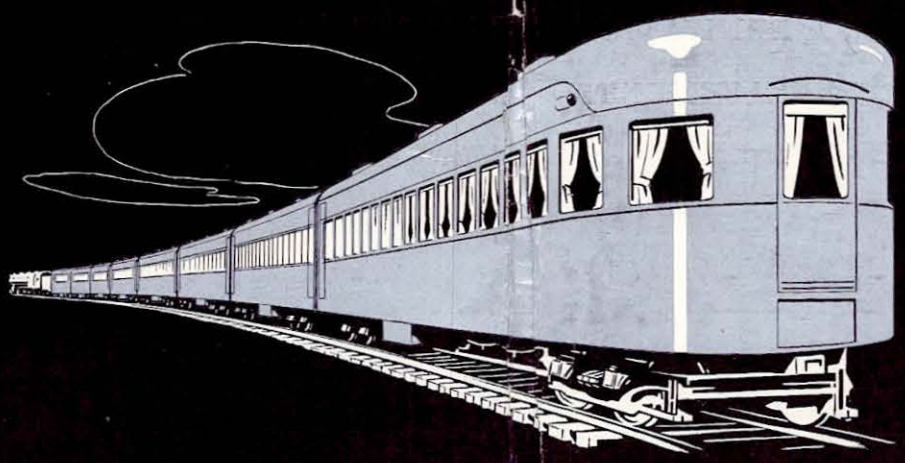
LIGHTNESS, PLUS



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The helpful co-operation of our staff of development engineers is at the command of the industry. ALUMINUM COMPANY OF AMERICA, 1878 Gulf Building, Pittsburgh, Pa.

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* Excerpt from Railway Signaling Editorial, Vol. 26, p. 99

UNION SWITCH & SIGNAL COMPANY
Swissvale, Pennsylvania

GENERAL RAILWAY SIGNAL COMPANY
Rochester, N. Y.

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History in the Making

As of January 1, 1935, automatic light signals were in service on 34,352 miles of track.